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ABSTRACT

In 1992, an evaluative study was conducted to describe systematically the characteristics of Northern Maine Technical College's (NMTC's) faculty and students with respect to specified teaching and learning variables. The study sought to determine and outline appropriate instructional improvement strategies for possible implementation at NMTC, using a case study research design. The study sample consisted of 209 full-time students and 36 full-time faculty. Conclusions, based on an analysis and comparison of the faculty and student data, included the following: (1) preferred teaching techniques of the NMTC faculty included lecture, written exams, questioning students, and homework; (2) the least favored teaching techniques of the NMTC faculty included panel presentations and debates, role-playing, independent study, and student presentations; (3) faculty's personality type affected the teaching techniques chosen for use; (4) teaching experience was not a factor in the frequency of use of certain teaching techniques by NMTC faculty; (5) NMTC faculty believed that the traditional didactic teaching methods, involving the giving of information and the application of knowledge, were the most beneficial for assisting NMTC students to learn; (6) NMTC students found predominantly teacher-centered learning techniques, such as "on-the-job" training and watching a demonstration as the most helpful to their learning; (7) NMTC students viewed predominantly student-centered learning techniques, such as giving a presentation in front of the class or leading a class discussion, as not helpful to learning; and (8) gender differences existed in the ways students preferred to learn, and age and marital status did influence the way students learned. Appendixes provide the survey instruments, a sketch of personality types, and notes on teaching techniques. (JMC)

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# A COMPARISON OF TEACHING AND LEARNING TECHNIQUES BY TEACHERS AND STUDENTS AT NORTHERN MAINE TECHNICAL COLLEGE

by

Norma M. McKinnon

A Major Applied Research Project presented in
partial fulfillment of the requirements
for the degree of Doctor of Education

Nova University

April, 1992

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Abstract of a Major Applied Research Project Presented
to Nova University in Partial Fulfillment of the
Requirements for the Degree
of Doctor of Education

# A COMPARISON OF TEACHING AND LEARNING TECHNIQUES BY TEACHERS AND STUDENTS AT NORTHERN MAINE TECHNICAL COLLEGE

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Norma M. McKinnon

April, 1992

Northern Maine Technical College (NMTC) is a two-year institution offering vocational and technical programs. Demographic studies at NMTC show an increase in the enrollment of students aged twenty-five to forty-four years, with a concurrent decrease in the enrollment of eighteen year olds. According to the literature, despite this national demographic trend, post-secondary educators tend to use the same instructional techniques they have always used.

The purpose of this evaluative study was to describe systematically the characteristics of NMTC's faculty and students with respect to specified teaching and learning variables in order to determine and outline appropriate instructional improvement strategies for possible implementation at NMTC.

Two instruments, developed by Drummond and Sutton (1978), were modified for use in the study. The student survey consisted of three parts: the first consisted of demographic questions; the second consisted of items describing teaching learning techniques; and the third consisted of one of three instruments: the Locus of Control Scale (Rotter, 1982), the Ways of Coping Questionnaire (Folkman and Lazarus, 1988), and the Learning Style Inventory (Kolb, 1985). The teacher survey consisted of twenty-three items describing teaching techniques.

The study employed the case-study research methodology. The resultant sample consisted of 209 full-time students and thirty-six full-time faculty. Additionally, information was obtained from five post-secondary institutions in the United States and Canada relative to successful instructional improvement efforts in the area of adult learning.

It was concluded that NMTC faculty believe that traditional, time-honored teaching methods, involving the giving of information and the application of knowledge, is the most beneficial for students' learning. Faculty's personality type does affect the teaching techniques chosen for use, and teaching experience is not a factor in the frequency of use of teaching techniques. Academic department assignment does affect faculty's use of instructional methods.

Additionally, it was concluded that NMTC students find the following learning techniques beneficial to their learning: "on the job" training, watching a demonstration, performing a procedure in the lab or shop, asking the teacher questions, taking a "hands-on" test, receiving personalized instruction from the teacher, doing a workbook exercise, being tutored in problem areas, listening to the teacher lecture, and doing homework assignments.

Gender differences do exist in the ways NMTC students prefer to learn. Women prefer passive learning methods; men prefer active learning methods involving group-work. Differences do exist in the ways students prefer to learn by age, portion of program completed, grade point average, marital status, locus of control, and learning style. Coping process and work status does not appear to influence the ways students prefer to learn. Students' most helpful learning technique is "on the job" training. There is some discrepancy in the way students and faculty view the helpfulness of teaching/learning techniques.

Based on the findings of the study it was recommended to the NMTC administration that the following strategies be executed in an effort to improve instruction at the college: (1) NMTC faculty add student-centered instructional methods to their repertoire of commonly used methods; (2) faculty conduct action research on teaching/learning in their classrooms; (3) steps be taken to assist faculty and student service staff to adapt to older students, for example, workshops on adult development, learning, and motivation theory; (4) a pilot study be conducted at NMTC on the use of student management teams (SMT's) (Nuhfer, 1991); (5) faculty develop, or adopt, a learning style inventory to be used each semester to assess students' learning needs and concerns; (6) a variety of tools be used for evaluating students' learning; (7) administratively supported faculty collaboration sessions occur throughout the academic year; (8) an instructional

skills workshop, modeled after the instructional skills workshop (ISW) program (Morrison, 1991), be offered annually on the NMTC campus; (9) administrators consider adopting a number of competencies considered essential for post-secondary educators in any discipline; (10) faculty's five-year professional development plans reflect goals and actions to be taken for attaining instructional excellence; (11) all new faculty hires complete an orientation program, grounded in learning theory and principles; (12) and curricula be modified or developed to promote positive attitudes and understanding of diversity, specifically learning diversity.

Dissemination of the report involves the following: distribution of copies of the report to NMTC's president, the Maine Technical College System president, and the library; submission of the report to ERIC and an appropriate journal for possible publication; and presentation of results to NMTC's faculty.

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# Chapter 1

# INTRODUCTION

Post-secondary institutions throughout the United States are experiencing dramatic shifts in the make-up of their student populations. The days when the typical student was a full-time resident of the school and between the ages of eighteen and twenty-two are over. When this occurrence is coupled with the fact that secondary school enrollments are decreasing substantially nationwide, it becomes clear that the survival of institutions is dependent upon the ability of institutions to attract and retain older students.

> In recent decades population growth has been accompanied by increasingly greater proportions of adults. From 1946 to 1964, birth rates increased dramatically throughout the United States. Although birth rates fell after that, there is now a wave of adults passing through the population. At the crest of the wave is the baby boom generation, comprised of persons now in their 30's and 40's. Increasingly greater numbers of these - and older - adults are attending college, either for the first time or as returnees (Nordstrom, 1989:1).

Older students are coming back to school in throngs, yet many educators do not understand how adults learn. Government reports (for example, The Productivity Imperative and the New Maine Economy, April, 1990) admonish post-secondary educators for their lack of ability to take advantage of new learning environment technologies needed to effectively and efficiently educate adult students. While adult development is by no means a fully articulated concept, there recently has been an increasing amount of information generated about adults and how they learn. It is imperative that educators understand and be able to apply the principles and theory of adult development in order to cultivate the type of learning environment that students of all ages need and deserve.

> Teaching adults can be a most exhilarating and rewarding experience or a most painful and frustrating experience. Unfortunately, the pain and frustration are often experienced by both the instructor and the students. Most adult educators have not been taught how to teach adults and revert to teaching the way they were taught (Breckon, 1989:59).

## Background and Significance

Northern Maine Technical College (NMTC), a two-year institution, is one of six technical colleges in the state of Maine. The basic mission of NMTC is to provide associate degree, diploma and certificate programs directed at the educational, occupational and technical needs of the state's citizens and the workforce needs of the state's employers.

Demographic studies at NMTC show a dramatic increase in the enrollment of students aged twenty-five to forty-four years, with a concurrent decrease in the enrollment of eighteen and nineteen year olds. The median age of students at NMTC has increased from nineteen and seven-tenths years in 1978 to twenty-eight and six-tenths years in 1991. The literature is becoming increasingly rich with discussions about the learning styles and preferred instructional methods of older students, yet the lecture method of classroom instruction is predominantly used by post-secondary educators.

NMTC's school motto is "Moving Toward Excellence for Tomorrow's Technology." If this ideal is to be a reality in the broadest sense, classroom technology will need to be updated, and this entails changed educational paradigms. There is a pressing need at NMTC to compare the instructional and learning techniques of teachers and students to ascertain whether the learning needs of both traditional and non-traditional students are being met. NMTC must fulfill its promise to students, the community, the region, and the state by graduating students who are fully prepared to function effectively in today's pluralistic society. Additionally, students have a right to enjoy the learning experience, learning in a way that is most effective and enjoyable for them.

The members of NMTC's professional development committee desire to know what faculty's training and development needs are relative to teaching and learning so comprehensive professional development planning can be undertaken. Furthermore, the members of the curriculum committee could benefit from specific knowledge about the instructional needs of NMTC's student population. The information derived from this study could conceivably go a long way toward helping NMTC move "Toward Excellence" in the 1990's.

## Research Questions

The specific objectives of this study are as follows:

1. To determine the types of instructional techniques used by NMTC instructors according to the following:

    a. personality type
    b. years of teaching experience
    c. program classification
    d. most successful instructional techniques

2. To determine how helpful students find the instructional techniques used by faculty.

3. To determine the student opinion of instruction by the following:

    a. program or major course of study
    b. grade point average
    c. portion of program completed
    d. learning style
    e. gender
    f. locus of control
    g. age
    h. marital status
    i. work status
    j. coping processes

4. To assess instructional improvement strategies that could be recommended for implementation at NMTC.

## Definition of Terms

The following definitions are provided in order to clarify for the reader terms that might otherwise cause confusion:

Nontraditional student - A student over the age of twenty-two years. Adult student, older student, and nontraditional student are used interchangeably.

Traditional student - A student aged seventeen to twenty-two years.

Mature student - A nontraditional student who is fifty-five years of age or older.

Learning style - The way in which one gains knowledge and/or skill and is assumed to relate directly to one's cognitive level.

Coping - "The cognitive and behavioral efforts to manage specific external and/or internal demands appraised as taxing or exceeding the resources of the individual" (Folkman and Lazarus, 1988:2).

Teaching technique - A means for helping the student to learn, for example, a field trip or a research paper. Teaching technique, method, style, or approach, are used interchangeably in this study.

## Assumptions

The first assumption made in this study was that the perceptions of students and faculty in respect to their preferred instructional techniques were accurate. In addition, it was assumed that the revised/updated questionnaires used in the study were equally as reliable and valid as the original instruments.

An assumption was made that the students surveyed were representative of the entire NMTC student population. Lastly, it was assumed that the findings of this study held some value for NMTC educators and students and that some of the proposed study recommendations would be implemented.

## Limitations

This study was limited to regular day programs and full-time faculty and students. The non-random sampling procedure did not include evening students or faculty, continuing education programs, nor faculty and students participating in NMTC's satellite programs.

Because students completed questionnaires on a voluntary basis, respondents may have been different in some way from typical NMTC students, thereby hampering generalization of findings to all NMTC students and other two-year institutions.

The intent of this study was to concentrate only on those variables that could be readily controlled within the limits of the study. As a result of this limitation, the reader is cautioned to take into consideration the distinct possibility that other variables may be involved in the conclusions that have been drawn. Lastly, like other agencies dependent upon state funding, NMTC is experiencing a severe revenue shortfall, which may diminish the likelihood for implementation of study recommendations.

## Chapter 2

## REVIEW OF THE LITERATURE

Demographic trends in the adult population are worth noting when discussing the importance of adult education. The U.S. Department of Education (1987) census data reveals the current crown in the population wave is represented by persons in their thirties. In 1980, the median age of all Americans was thirty years old. In July, 1986, the median age was thirty-one and seven-tenths years. In 1980, twenty-seven and seven-tenths percent of the population were between the ages of twenty-five and forty-four years of age. In 1986, thirty-one and four-tenths percent of the population were in that age range (Nordstrom, 1989).

> The adult education literature generally supports the idea that teaching adults should be approached in a different way than teaching children and adolescents, groups sometimes referred to as preadults (Imel, 1989:1).

With the advent of older students on campus, scholars have proposed numerous models and theories relative to adult learning.

### Adult Development

Various researchers, including Buhler, Havinghurst, Jung, Freud, and Erikson have formulated sequential models of adult development. More recent investigators, such as Levinson, Gould, and Sheehy have formulated age-related sequential models of adult development that view the various stages of adulthood in terms of different strategies toward perceiving and coping with reality. In addition, several theorists have postulated models of adult development with a special focus, for example, Loevinger's concentration of stages of ego development and Kohlberg's notion of moral and intellectual development.

While adult development is by no means a fully articulated concept, there has recently been an increasing amount of information generated about adults and how they learn. Systematic conceptions of adult development are now evolving. Berrin, Neugarten, Kohlberg, Hunt, Loevinger, Heath, Chickering, Sprinthall, and Bents and Howey have been engaged in research involving adults for several years now. Second and third generation scholars are following these investigators. Many of the findings of such research and examination of human development have important implications for adult education.

Traditionally, people assume that the development and growth of the individual occurs only during childhood, leaving the adult years marked by relative inactivity. The belief now is that adults continue to develop in well-defined stages just as children do. Knox (1977:9) defines "development" as "the orderly and sequential changes in characteristics and attitudes that adults experience over time." Theorists have been speculating about adult development for many decades. In fact, Havinghurst was writing about adult development in the 1950's and continues to be a leading theorist on adult development. Havinghurst (1973:17) says:

> Adulthood is not all smooth sailing across a well-charged sea with no adventures or mishaps. People do not launch themselves into adulthood with the momentum of their childhood and youth and simply coast along to old age: Adulthood is a developmental period in almost as completely a sense as childhood and adolescence are development periods.

Levinson (1978) divides the years of adulthood into four stages of development: early adulthood, parenthood, post-parenthood, and retirement. Transitions between stages are rocky and are marked by stress and personal assessment. Definite "passages" occur around age thirty, as adults settle down into their roles as parents and workers; around ages forty-five to fifty, the so-called mid-life transition; and finally around ages sixty to sixty-five, as adults prepare for late adulthood, retirement and death. Levinson aptly notes that for adults there is a "time to marry, a time to raise children, and a time to retire" (24). Sheehy (1976) also describes "passages" that adults must successfully pass through.

"Education serves a key function of assisting the adult in transition by helping to provide the needed sense of direction" (Nordstrom, 1989:7). Knox (1977) argues that adults need to focus on a sense of the current self versus the ideal self. Positive change occurs when adults "place themselves in situations that encourage what they want to become" (29). "A college degree increases the number of `life chances' an adult has, that is, the number of available opportunities from which to choose" (63).

> For the adult seeking challenge, growth, or direction in life, therefore, the return to college encourages an optimistic approach to life accompanied by a feeling of assertiveness and a sense of direction (Nordstrom, 1989:7).

Sprinthall and Thies-Sprinthall (1980) offer a promising alternative conception for adult development. They present a case for a cognitive-developmental approach for understanding adult learning. Following Dewey, they see the possibility of creating programs to simulate developmental growth. They suggest that it may be possible to refine programs to the point where stage growth may be simulated, citing the work done at The Far West Laboratory and at Michigan State University as examples of the successfulness of their idea. The focus of on-site, collaborative education which gradually increases the complexity of student perception seems congenial with elements of the cognitive-developmental approach according to the theorists. These theorists admit that to build a cumulative base in theory and research is still the most pressing need facing the teaching profession.

It can be concluded that development does take place from birth until death and that adult development should be a primary concern of all educators. Additionally, adult learning is an individual matter because each adult is at a different point in his/her developmental growth.

## Teaching/Learning Theories and Concepts

Many models have been developed over the past thirty years to provide a framework for analyzing and understanding the teaching/learning process. Nuthall and Snook (1973) identified three dominant models which they labeled the "behavior-control model," the "discovery-learning model," and the "rational model."

The behavior-control or behavior-modification model consists of that set of concepts and claims about teaching which has arisen from the attempt to apply the interpretive framework of behavioral psychology to the classroom. The behavior-control model is a stimulus-response view of teaching and incorporates programs such as programmed instruction and behavior modification.

The discovery-learning model incorporates those views of teaching which place greatest emphasis on the self-directed activity of the student. It might be seen as the contemporary successor to the authoritarian-democratic model, but it also incorporates concern for creativity and elements of cognitive psychology.

The rational model has philosophic basis and states that the practice of teaching must be influenced by the logic of agreement and justification. This model owes a lot of its impetus to the application of analytic philosophy. Many scholars place all teaching models in two categories rather than three. Other scholars classify teaching and learning models differently.

Jackson (1986:116) contends:

> Two distinguishably different ways of thinking about education and of translating that thought into practice undergird most of the differences of opinion that have circulated within educational circles over the past two or three centuries.

Jackson calls these two different ways of thinking, the "mimetic" and the "transformative." The mimetic tradition involves the transmission of factual and procedural knowledge from one person to another and the transformative tradition involves qualitative change or a metamorphosis of the individual being taught. Jackson's educational models are synonymous to the behavior-control and discovery-learning models of Nuthall and Snook. Some scholars separate learning models and theories into two distinct families.

Beighley (1991) divides the major learning models and theories in to the stimulus-response model and the stimulus-organism-response model. In the stimulus-response model, man is neutral, passive, reactive, and unmotivated, except by basic organic drives. The theories that fall under the umbrella of this model include behaviorism, behavior modification and shaping, associationism, connectionism, bond theory, reinforcement theory, reward-punishment, conditioning (both operant and classical), transactional leadership, and pedagogy.

The goals of this model of education are usually behavioral, that is, spelled out and dictated to the student by the teacher (from society). Evaluation is based on measurement, testing, and comparative grading conducted by one other than the learner.

In the stimulus-organism-response model, man is good "or" bad (but something), active, interactive, and innately motivated to learn or to self-enhance. The stimulus-organism-response model includes such elements and theories "third-force" psychology (not to be confused with the fourth wave which is New Age psychology), self-actualization theory, organismic, cognitive, field, existential, phenomenology, life-space, gestalt, topological, transformational leadership, and andragogy.

The goals of this type of education are usually self-determined or cooperatively determined by the learner and facilitator. Evaluation is done by whatever means makes sense in relation to the objectives. It may include self-evaluation.

In the stimulus-response model, learning is teacher-centered and the teacher is authoritarian. Crow and Bonney (1975:40) point out:

> Research suggests that authoritarian personalities often gravitate toward the ministry, the military, politics, police work, and teaching. In each of these vocations, the authoritarian sees the opportunity to exercise power for personal gratification.

In the stimulus-organism-response model, learning is student-centered and the teacher is democratic.

Many curriculum scholars have included an overview of learning theories and principles in their texts. Following is a summary of the major learning theories/principles taken from Ornstein and Hunkins (1988), Beane, Toepfer, and Alessi (1986), Eisner (1985), and Miller and Seller (1985).

The first three psychologists and their respective theories/principles are behavioral; the next group, numbers four to nine, are cognitive. The last three psychologists and their respective theories/principles are humanistic.

Thorndike proposed the "law of effect." He contends that when a connection between a situation and a response is made, and it is accompanied by a satisfying state of affairs, that connection is strengthened; when accompanied by an annoying state of affairs, the connection is weakened. In essence, the law of effect holds that responses are "stamped in" by rewards and "stamped out" by punishments. This principle is not to be confused with Caine and Caine's (1991) connections which involve teaching and the human brain.

Pavlov and Watson's "classical conditioning" theory is based on the stimulus-response model discussed above. Whenever a response is closely followed by the reduction of a drive, a tendency will result for the stimulus to evoke that reaction on subsequent occasions; association strength of the stimulus-response bond depends on the conditioning of the response and stimulus.

B.F. Skinner developed the "operant conditioning" theory of learning. In contrast to classical conditioning, no specific stimulus consistently elicits operant behavior. With operant conditioning, an organism learns to emit an operant that is reinforced. Initial "correct" responses may be performed by random trial and error and physical or verbal guiding. Reinforced responses occur more frequently.

Piaget proposes "cognitive stages" of human development. He believes four cognitive stages form a sequence of progressive mental operations; the stages are hierarchical and increasingly more complex. Piaget is also responsible for the concepts of "assimilation," which is the incorporation of new experiences, "accommodation," which is the method of modifying new experiences to derive meaning, and "equilibration," which is the process of blending new experiences into a systematic whole.

Gagne's "levels of learning" includes some behaviorist principles as well as cognitive. Gagne's eight types of learning range from simple to complex, both behavioral and cognitive; they are based on orderly, prerequisite, and cumulative processes of learning.

Guilford proposed the "structure of intellect" which involves three major dimensions of thought: content, operations, and products. Each is subdivided into several factors that combine and interact to form 120 possible factors. Guilford's conception of "convergent-divergent thinking" is a qualitative method of thinking. The first, convergent, corresponds with problem solving, reflective thinking, and the scientific method; the second, divergent, corresponds with creative thinking, intuitive thinking, and the artistic method. These concepts are consistent with Albrecht's (1983) right-left brain theory.

Dewey coined the term "reflective thinking." Reflective thinking involves being in a situation, sensing a problem, clarifying it with information, working out suggested solutions, and testing the ideas by application. Reflective thinking goes way beyond just thinking; it involves action research in the classroom.

Lipman-Sternberg advocated "critical thinking." This means to teach students how to think, including forming concepts, generalizations, cause-effect relationships, inferences, consistencies and contradictions, assumptions, analogies, and so forth.

Bruner and Phenix are responsible for "structure of a subject," and the "inquiry-discovery" method. The structure of a subject involves the knowledge, concepts, and principles of a subject; learning how things are related is learning the structure of a subject. The inquiry-discovery method uses a body of organized knowledge; the first method tends to be convergent and the second method tends to be divergent.

Maslow developed the "hierarchy of human needs theory." Maslow proposed that humans are motivated by five levels of needs: physiological, safety, love/belonging, self-esteem, and self-actualization. The needs are related to survival and psychological well-being. The needs are hierarchical and serve to direct behavior.

Rogers, a humanist like Maslow, provided the "becoming a person" concept. Becoming a person means being open to novel experiences, developing trust in others, and accepting oneself. Rogers also gave us the "freedom to learn" concept, which means to become a whole person. This requires freedom to learn; the learner is encouraged to be open, self-trusting, and self-accepting.

Raths coined the terminology "value clarification." This involves an analysis of personal preferences and moral issues in an effort to reveal or clarify one's values - that is, one's beliefs, attitudes, and opinions. Many investigators are looking to the human brain to determine and diagnose how individuals of all ages learn.

Research into human brain processes has shown the existence of two distinctly different modes of thought. These two modes are associated with the physical division of the brain into the left and right hemispheres. Left-brain thought processes show up as statements oriented to logical reasoning, elements, sequences, facts and figures, and conceptual structures. Right-brain thought processes show up as statements about people, feelings, experiences, patterns, relations, and philosophical concepts (Albrecht, 1983). "It is clear that most people learn to favor one of these two thinking modes (logical and intuition) over the other as they grow up and develop in to adults" (Albrecht, 1983:12).

Albrecht believes that the tendency to rely on one predominant mode for the majority of one's thinking processes points to the concept of cognitive style as a framework for understanding how someone thinks, learns, communicates, and decides. This mode preference is one of the two dimensions of thinking style, the dimension of structure. The other dimension of thinking style deals with what a person thinks. Here the contrast is between concrete thinking and abstract thinking. Albrecht developed MINDEX, a self-assessment instrument, which is an application of knowledge about human information processing that diagnoses thinking style or cognitive style. Cognitive research on the adult learner indicates that the ability to make abstract judgements may increase with maturity (Arlin, 1975).

Caine and Caine (1991) summarize the accumulated insights of the research conducted on brain-based learning in the form of twelve principles that can serve as a general theoretical foundation for brain-based learning. This framework for learning and teaching moves us far away from methods and models as we currently know them. The principles proposed by Caine and Caine are further summarized as follows:

(1) The brain is a parallel processor: the implication being that teaching must be based on theories and methods that guide the teacher to make orchestration possible. No method or technique can adequately encompass the variations of the human brain.

(2) Learning engages the entire physiology: the implication being that everything that affects our physiological functioning affects our capacity to learn. Stress management, nutrition, exercise, and relaxation, as

well as other facets of health management, must be fully incorporated into the learning process.

(3) The search for meaning is innate: the implication being that the learning environment needs to provide stability and familiarity; this is part of the function of routine classroom behaviors and procedures. At the same time, provision must be made to satisfy our curiosity and hunger for novelty, discovery, and challenge.

(4) The search for meaning occurs through "patterning:" the implication being that for teaching to be really effective, a learner must be able to create meaningful and personally relevant patterns. Integration of the curriculum and life-relevant approaches to learning are ways to do this.

(5) Emotions are critical to patterning: the implication being that instructors need to understand that students' feelings and attitudes will be involved and will determine future learning. It is important to monitor the emotional climate in the school and classroom on a consistent basis, using effective communication strategies and allowing for student and teacher reflection and metacognitive processes. In general, the entire environment needs to be supportive and marked by mutual respect and acceptance both within and beyond the classroom.

(6) The brain processes parts and wholes simultaneously: the implication is that good teaching necessarily builds understanding and skills over time because learning is

cumulative and developmental; however, parts and wholes are conceptually interactive.

(7) Learning involves both focused attention and peripheral perception: the implication is that the teacher should organize materials that will be outside the focus of the learner's attention, such as charts, illustrations, set designs, art, and music. Teachers should also "practice what they teach" because our behavior is discerned at some level by learners.

(8) Learning always involves conscious and unconscious processes: the implication is that "active processing" allows students to review how and what they learned so that they begin to take charge of learning and the development of personal meanings. One example might be students' becoming aware of their preferred learning style.

(9) We have at least two different types of memory: a spatial memory system and a set of systems for rote learning: the implication being that although memorization is important and useful, in general teaching devoted to memorization does not facilitate the transfer of learning and probably interferes with the subsequent development of understanding. By ignoring the personal world of the learner, educators actually inhibit the effective functioning of the brain.

(10) We understand and remember best when facts and skills are embedded in natural, spatial memory: the implication is that spatial memory is generally best invoked through experiential learning, an approach that is valued

more highly in some cultures than in others. Teachers need to use a great deal of real-life activity, including classroom demonstrations, projects, field trips, visual imagery of certain experiences and best performances, stories, metaphor, drama, and interaction of different subjects. Success depends on using all of the senses and immersing the learner in a multitude of complex and interactive experiences. Lectures and analysis are not excluded, but they should be part of a larger experience.

(11) Learning is enhanced by challenge and inhibited by threat: the implication is that teachers and administrators need to create a state of relaxed alertness in students. This combines general relaxation with an atmosphere that is low in threat and high in challenge.

(12) Each brain is unique: the implication is that teaching should be multifaceted to allow students to express visual, tactile, emotional, and auditory preferences.

In conclusion, there are many implications surfacing from brain research, the most important being that educators should discard outmoded assumptions about how people learn. For example, "we are moved inexorably beyond the information-processing model of memory as the predominant paradigm for learning" (Caine and Caine, 1991:87). This suggests that "the lecture" should be discarded or at least enhanced if learning is to be effective and efficient.

## Adult Learning

> Teaching adults can be a most exhilarating and rewarding experience or a most painful and frustrating experience. Unfortunately, the pain and frustration are often experienced by both the instructor and the students. Most adult educators have not been taught how to teach adults and revert to teaching the way they were taught (Breckon, 1989:59).

Hughes (1983) and many other scholars, acknowledge that colleges and universities throughout the United States are experiencing a dramatic shift in the composition of their student populations. Students are no longer full-time and between the ages of eighteen and twenty-two. "So dramatic are these changes that the growth and survival of institutions of higher education are dependent upon the ability of these institutions to attract and retain these older students" (Hughes, 1983:51). The literature generally reveals little research on adult learners' preferred methods or styles of learning new content, although it is suggested that teaching strategies should be directed to their past life experiences (Seidl and Sauter, 1990).

Apps (1981) compared adult learners with traditional students. In summary, he argues that although returning students are similar to traditional students in some respects, the two groups differ in several important ways. The major areas of difference are as follows: (1) life experience - the returning students bring a wealth of experience to the classroom; (2) motivation - the returning students are highly motivated, with this motivation often related to a specific goal for attending college; (3)

academic behavior - returning students often have problems adjusting to university life, including learning academic procedures, rusty study skills, inability to concentrate, and adjusting to problems associated with unlearning; and (4) other problems - unrealistic goals, poor self-image, social-familial problems, and sometimes an excessive practical orientation.

A preference for informal learning by older students has surfaced as a consistent theme in the literature. Hameister and Hickey (1977) contrasted traditional and nontraditional students and found that nontraditional students are influenced by informal education, often do not understand formal education, lack study and communication skills but have relevant work experience, base their frame of reference on life experiences, and often cannot be judged accurately on their academic potential. White (1981:2) explains the contrast in educational needs and expectations further:

> Youth traditionally engaged in formal learning with the notion that the experience would be stored up for later use; living begins after learning is completed. More mature adults insist on putting their learning to work relatively soon. They are less subject-matter and more problem-solving centered, even when learning has no more immediate application than a better understanding or appreciation of some remote aspect of life. Adults want and expect their learning to help them understand and deal with those situations faced in their every-day lives.

An extensive synthesis of the literature on the instructional preferences of older students conducted by Hughes (1983) can be summarized as follows: Nontraditional students prefer a problem-solving focus; practical learning experiences; learning that is incorporated into an existing framework of learning and experience; an individual approach to instruction; a teaching approach other than lecture; grades not only based on tests; more than one way to meet course requirements; and instructors who are interested in progress, who are relaxed and informal in the class, who use many examples, and have a realistic view of students' outside duties. Older students return to school for various reasons.

Nordstrom (1989) asserts that adults who return to college tend to be in transition and experiencing crises in their lives (e.g. divorce, unemployment, or geographic relocation). They tend to be sacrificing more than younger students to attend college and to be highly motivated, yet lacking in confidence to succeed. Their developmental stages, values, study skills, and life experiences differ sufficiently from those of younger students that colleges should rethink their philosophies of teaching and focus of student services to meet the divergent needs that adult students have. High motivation to learn can have a negative effect according to some.

Sarnat believes that although adult learners' intense motivation to learn may be a constructive element, it may also provide limitations to the learning situation (Knox, 1977). He contends that adult learners have obstacles to overcome, including loss of status, "unlearning," and the vulnerability that is experienced as adults lose their own authority position and assume a dependent role. The unlearning necessary for an adult student requires the modification of a cognitive structure developed from the integration of multiple life experiences.

Jacobs (1989:329) advises:

> As the proportion of older students grows, it will become crucial to develop methods of instruction acknowledging and creatively unifying the varieties of experience to be found in such diverse groups.

Although knowing how to teach adults is necessary, many scholars believe that learning is a very personal experience occurring within the the adult's mind. Breckon (1989:63) says:

> Adult learning is voluntary in all its dimensions: participation, acquisition, and outcome. Adult learning is the non-predictable response to new ideas.

Parks (1989:2) contends:

> Alternative delivery strategies help guarantee success and opportunities to learners who do not fit the mold of the traditional student. Improving the delivery of vocational education may require only consideration of available resources to maximize program offerings.

The educational leader needs to be acutely aware of the classroom environment. According to Darkenwald (1989) adult students want to be involved in the learning experience, to have teacher support, and to have clear, organized goals.

There are some generally accepted principles for facilitating adult learning, regardless of one's stage of development. The following assumptions have broad-based endorsement and some empirical support. According to Knowles

(1980) these principles constitute the foundation stones of modern adult learning theory:

1. Adults are motivated to learn as they experience needs and interests that learning will satisfy; therefore, these needs and interests are appropriate starting points for organizing adult learning activities.

2. Adult orientation to learning is life-centered; therefore, the appropriate units for organizing adult learning are life situations, not subjects.

3. Experience is the richest resource for adult learning; therefore, the one methodology of adult education is the analysis of experience.

4. Adults have a deep need to be self-directing; therefore, the role of the teacher is to engage in a process of mutual inquiry rather than to transmit knowledge to them and then evaluate their conformity to it.

5. "Individual differences among people increase with age; therefore, adult education must make optimal provision for differences in style, time, place, and pace of learning" (31).

Adult learning theory suggests that adult learners have the ability to be self-directed, have past experiences that serve as resources for future learning, are interested in immediate applicability of learning within a problem-solving framework, and are ready to be actively involved in increasing their competence to perform adult roles and tasks. Some developmental theorists believe that adults differ in the type of educational environment they prefer based on their developmental stages.

Bents and Howey (1981) are convinced that while adults are often self-directing, engage in mutual inquiry, and are inclined toward the pragmatic, there are qualitative differences. They believe that adults vary in the degree of self-directedness, ability and desire to work together, and competence to deal with conceptual problems and universal principles as well as practical concerns. Additionally, these theorists believe that the differences among adult learners is related to their developmental stages.

A basic premise of the andragogical model is that instuctors and instruction always start with the learners rather than with the subject matter. Instruction must start with the level of competence and interests that exists in the group, rather than with what instructors wish were there or used to be there (Baldwin and Wasiluk, 1988).

Adults come to the learning encounter bringing individual baggage. "The baggage contains all that the adult is, has been and hopes to be, as well as all that life means to them" (Baldwin and Wasiluk, 1988:60).

> The adult mind should not be thought of as an empty vessel to fill. It is already filled with a great deal of previous learning. New learning will be processed against all that has occurred before (Baldwin and Wasiluk, 1988:60).

The principles of andragogy according to Baldwin and Wasiluk (1988) are summarized below:

1. Adults learners need to see relevance and how material is or will be useful to them.

2. The emotional climate of the classroom should be attended to by instructors.

3. The instructor and students should learn together via cooperation and collaboration.

4. Competency-based grading systems are preferable to grading scales.

5. Learning through competition should be discouraged.

6. Instructors should involve students in planning, implementing, and evaluating the curriculum.

7. Students should be actively involved in the learning process.

8. The more that learners' senses are involved, the greater the amount of learning that occurs.

9. Oral participation by learners enhances participation.

10. The instructor is not a dictator or superior to learners.

11. The socratic method of teaching has been demonstrated to be effective.

12. Instructors should make use of the experiences of learners in their teaching.

13. Instructors should try to relate new ideas to old concepts when teaching.

14. Repetition, recency, reinforcement, and relevance are widely accepted principles for adults as well as children.

Do these principles apply to mature learners (over the age of fifty-five years) as well? Designing education for mature adults is an area where a vacuum exists. McWhinney (1990) argues that the learning needs of mature adults are being ignored. He contends that most adult education conducted in this country is directed toward the goals of young adults, and proposes differing styles of learning and purposes for learning by mature adults. Furthermore, McWhinney believes that although mature adults have learning elements in common with the general adragogic learning introduced by Knowles, they "differ so greatly that to use the general model misdirects the learning efforts of all levels of maturity" (McWhinney, 1990:16). Many myths exist about adult students.

Karmos and Greathouse (1989) refute myths about adult learners and call for empowering education based on the following principles of adult learning and development: (1) adults can learn a lot; (2) they demand solid content; (3) they want to learn something new; and (4) they guard their self-esteem. According to these theorists, theories of life cycle phases, adult development, and adult motivation to learn provide a basis for planning and developing campus activities to attract the attention of this market.

The purpose of models and theories is to translate them into the practical realities the classroom. There have been a number of older studies which have looked at teaching methods in vocational technical schools (for example, Finch, 1969; Tuckman, 1968; Oliver, 1967; Drummond and Sutton, 1978); however, the majority of the studies have focused primarily on single types of teaching models in limited subject areas. New studies are surfacing that focus on the effect of teaching methods on adult learning in two-year colleges (for example, Freeland and Franklin, 1989; and, Mickler, Zippert, and Prejean, 1987).

Schneider (1989) advocates the use of peer coaching in higher education, particularly with women. She reports many instances where peer coaching has been used successfully with adults. Adams (1989) contends that there are pre-conditions necessary for adult general education. He says for learning to take place the following dimensions constituting a set of conditions must be present: (1) a willing learner, (2) a willing teacher, (3) content, and (4) a suitable setting. Adams argues that there is a dialectical relationship among these variables and many adult learners have difficulty learning when this type of learning climate is not provided.

Other educators argue for high structure when teaching adult learners. Howard (1988) notes that adult students learn best when following a well-organized program of instruction. Galerstein (1982) conducted a faculty survey at the University of Texas at Dallas that showed faculty had no objections to most students' being over thirty, did not favor age segregation, found older students better motivated, and felt no need for changes in academic standards. Faculty believed special training for dealing with adult students was not needed. Russell's (1990) study of forty registered nurses found that individuals labeled as preferring high structure achieved better in low-structure settings and vice versa, a result contrary to outcomes reported in the literature and assumed for years.

Another study of faculty opinions found that some faculty regarded adult students as passive recipients of prescribed information, contrary to the collaborative mode and adult education in general (Freeland and Franklin, 1989). A content analysis of 1,462 written responses provided by the adult learners explaining their rationales for preferring differing learning interaction patterns was conducted by Tracy and Schuttenberg (1986). Eight major response categories emerged, including instructor-centered and collaborative rationales. According to this study adults can fall into either group of preferring high structure or low structure.

Check (1984) investigated theoretical models, learning styles, and activities adults prefer. From a total of 154 survey forms administered to undergraduate and graduate students in adult studies and in the adult learner course at the University of Wisconsin-Oshkosh, 119 questionnaires were analyzed, using a chi square model on all twenty items in the survey. Respondents showed a preference for an eclectic theoretical approach to teaching and learning. These same subjects strongly endorsed learning by insight, indicating that their favored mode of learning was through the lecture and discussion approach. Furthermore, these same subjects desired an outline of the lecture. Even though previous studies show that adults prefer a great deal of freedom in choice of course content, findings of Check's study did not support this. As expected, the adult learner does take notes during the lecture; this same learner was also assigned a term paper as a requirement of the course. As is true with the traditional student, the adult learner accepts the practice of testing; however, a large majority of the adults wanted a test that included both objective and subjective items.

In contrast to the above findings, a study of adult English students at Seattle University showed that students preferred the following: (1) a problem-solving focus (2) practical learning experiences, (3) learning that is incorporated into existing experience, (4) an individual approach to instruction, (5) teaching approaches other than lecture, (6) grades based on more than tests, (7) a variety of ways to meet course requirements, and (8) instructors who are interested in their progress, who are relaxed and informal in class, and who have a realistic view of their students' outside duties (Siegel, 1984).

Consistent with Siegel's findings, Shuttenberg et. al. (1984) found that adults desire a variety of learning experiences. Imel (1989) also found that teachers actually do use a different style when teaching adults. Respondents in two of Imel's studies reported they spend less time on discipline and giving directions, provide less emotional support, structure instructional activities less tightly, and vary teaching techniques more. Follow-up classroom observations in one study did not verify the self-reported differences in teaching behavior. That study did find that a nontraditional, less-formal room arrangement did lead to the use of a more student-centered approach; teachers with more formal training in adult education tended to use student-centered approaches the least; and the more flexible and responsible teachers were less experienced, female, secondary-level, and taught personal enrichment classes.

A study was conducted in Spokane, Washington to determine motivational factors and preferred conditions that would encourage adults to participate in learning activities (Young, 1980). Interviews were conducted with 600 randomly selected households (89 percent success rate) distributed across the age, educational attainment, occupational, and socioeconomic spectrum. It was found that the predominant purpose for participating in some kind of learning activity for adults of all ages was to complete a program they had once started. Second in importance to women of all ages was meeting new people and becoming better informed, while men were interested in learning something to help them on their jobs and learning something to use in their spare time. Variations of the ranking of these motivations were seen among age and sex groups. The study found that the non-traditional method of learning that had been used most by both men and women was supervised independent study, followed in order by video tape cassettes, correspondence courses, audio cassettes, and educational television. Most adults preferred classes at a college over other locations, and in the evenings, although this varied among age and sex groups.

Hunter and McCants (1977) studied students' preferred learning styles at Sinclair Community College utilizing the Learning Styles Inventory (LSI). A disparity was found in the preferred learning styles of older and younger students. The investigators suggest that this means new instructional strategies aimed at the younger generation are needed. Experiential learning is one such type of instructional strategy being used by some educators.

Heermann (1977) argues for the need to incorporate experiential learning of many types into two-year college education. Experiential learning falls into two broad categories, learning through life experience or nonsponsored prior learning, and sponsored learning which is incorporated into institutional programs designed to give students direct experience in integrating and applying knowledge. Some investigators have found that gender impacts the way adults learn.

Schmidt (1983) found that significant differences existed between adult males and females in learning style preferences. For example, females indicated a significantly higher preference for using language as a media for learning. In this same study fifty-three percent of the adult students indicated a strong or a very strong preference for establishing their own learning goals within the classroom. The results indicated that while the returning adult students wanted to set their own learning goals, independent of the instructor, they valued the role of the teacher as content expert and climate setter.

Not all educators believe that good teaching can be equated with technique. Palmer (1990:11) states that "good teaching comes from the integrity of the teacher, from his or her relation to subject and students, from the capricious chemistry of all of it." This experienced sociology professor from UC-Berkeley contends that "good teaching is an act of generosity, a whim of wanton muse, a craft that `may' grow with practice, and is always a risky business ... Teaching is a maddening mystery" (11). Palmer charges teachers to realize that "good teaching must deal with the fact that many students prefer to sit silently on the sidelines" (1990:11). This notion is at odds with established andragogical principles.

Despite the disparate findings, educational scholars generally agree that teachers should match their teaching style(s) with the students' learning style(s). Reckinger (1980) believes that humanistic "alternative" teachers should use instructional models that call for teaching people according to the way they learn and simultaneously recognize that teachers, like students, vary in style and personality. Mickler, Zippert, and Prejean (1987) plead for teachers to match their teaching strategies with students' learning styles.

It can be concluded that although adult learning is an individual matter, for the most part, adult learners are self-directed and cannot be motivated or taught or changed by others. They can learn if they choose to, and to learn is to change. The educator's task is to provide the appropriate climate for learning to take place; therefore, the educator is a facilitator of learning (change). Adult learning facilitators provide resource material, assisting learners to process new ideas by providing the appropriate learning environment.

The learning environment is low-stress, involves team-work, provides practical learning experiences, provides a problem-solving focus, provides for learning that is incorporated into an existing framework of learning and experience, provides a teaching approach other than exclusively the lecture, provides more than one way to meet course requirements, allowing the facilitator to be a learner along with the student. Facilitators of learning are interested in students' progress, are relaxed and informal in the class, use many examples, and have a realistic view of students' outside duties.

The learning process is a facilitation of an interaction for learners between the new and the old. Adult learning is nonpredictable because new ideas combine with old ones inside the learner's mind and produce varying outcomes which are dependent upon the individual. Probably the key element of adult learning is the learning climate. Creating the climate is hard work: Excellent teaching is hard work. Many universities and colleges have developed and implemented exemplary instructional improvement programs designed to enhance the learning of both traditional and nontraditional students.

## Exemplary Instructional Improvement Programs

Edward Nuhfer, Professor in the Geosciences department at the University of Wisconsin at Platteville, is conducting some interesting research on "student management teams," sometimes informally called "the Nuhfer system." This system which has been pilot tested at the University of Wisconsin at Platteville shows evidence that the Nuhfer system is beneficial in promoting teacher effectiveness.

The student management teams have some established parallels with Japanese management quality circles of modern industry and with the traditional brainstorming groups of research centers. There are important differences between the student management teams and the more widely recognized quality circles popularized by Deming for industry.

The assumption underlying the student management team system is that students, in conjunction with their instructor, are responsible for the success of any course. As student managers, students on the management team's special responsibility is to monitor the course through their own experience, to receive comments from other students, to work with their instructor on a regular basis, and to make recommendations to the instructor about how the course can be improved.

Nuhfer (1991:1) says that "most of our research [at The University of Wisconsin at Platteville] has been in adopting modern management methods in the classroom rather than introducing or endorsing particular pedagogical techniques." Nuhfer and his associates at the Teaching Excellence Center at the University have designed a workshop on student management teams which they present at national conferences. Nuhfer and his associates are available to other institutions for consultation involving the Nuhfer system. The system is a vehicle for improving teaching and effecting change. This student evaluation method can make the lecture method of instruction an effective strategy for learning (Nuhfer, 1991).

The Centre For Curriculum and Professional Development in Victoria, British Columbia has developed an instructional skills workshop (ISW) program, which is a peer-based program designed to improve the instructional skills of both new and experienced instructors (Morrison, 1991). The program consists of a three tier system of an instructional skills workshop, a facilitator skills workshop, and trainer training.

While the ISW Program was originally developed for use in British Columbia, it has been adopted in other areas across Canada and the United States, for example, the

California Community College system. The ISW does not have a rigid format that must be adhered to. It is recognized that each institution has schedules and policies, and for this reason Morrison notes that many colleges/institutes have developed formats that suit their needs.

Personnel from the Colorado Community College & Occupational Education System in Denver, Colorado conducted an extensive analysis of the professional development needs of Colorado's vocational educators. The needs assessment contributed to the formation of a professional development plan for their vocational educators (Hartley, Brookhart, and Smith, 1990). Many of the fifteen recommendations resulting from the needs assessment can be generalized to other institutions. They involve such areas as the inclusion of part-time faculty, the development of regional professional development plans, and a plan for state level business and education partnerships for technical skills update.

The faculty and administrators at Albuquerque Technical-Vocational Institute formulated a professional development and career advancement plan for faculty (Cordova, 1990). The plan outlines activities appropriate for the professional development and career advancement of both full-time and part-time faculty. The goal of the plan is instructional improvement and includes such activities as professional internships, team teaching and exchange teaching, and community service. Additionally an extensive listing of teaching competencies have been developed and could be used for evaluating instructional effectiveness.

Many other institutions have documented success in developing teaching excellence programs, for example, Alfred State College, Alfred, New York; Arizona Western College, Yuma, Arizona; Fullerton College, Brea, California; and Johnson County Community College, Overland Park, Kansas. These schools, like the ones cited above, are all members of the National Council for Staff, Program and Organizational Development (NCSPOD), and as such, are serious about human resource development. The next section provides information about questionnaire development, which is an essential aspect of evaluative research.

### Questionnaire Development

Sometimes investigations are conducted using instruments or questionnaires that do not display sufficient validity and reliability to warrant its popularity. For example, DeCoux (1990:1) charges:

> Use of the Kolb LSI in nursing education is not recommended due to the documented instrument weaknesses and the general lack of correlation between learning style, as measured by the LSI, and other variables ... Whether the problem lies solely in the LSI instrument or is inherent in the experiential learning theory itself is a thought which cannot be dismissed entirely.

DeCoux cautions that research findings are only as good as the instruments used in the data collection process.

Costin, Greenough, and Menges (1971:511) note:

> The methods of developing an using student rating forms have varied considerably. Often the questionnaires or scales were developed by student groups, departmental

> committees, or by individual faculty members. Only occasionally were these instruments developed under the auspices of a committee or special academic division whose members were specialists in educational measurement.

These comments substantiate the thinking that educational measurement specialists should be involved in questionnaire development.

Donald Busche, Professor at Saddleback Community College, CA is considered by some to be an expert in the area of questionnaire development and administration. The information that follows is summarized from materials he authored in 1991. Busche uses these materials in lectures and presentations given to graduate students.

The questionnaire has been used and misused perhaps more than any other data-gathering technique. It is the instrument of choice when a large sample is required and one's finances are limited. General considerations in developing a good questionnaire follow:

(1) Visualize the respondents: how they may react toward the study; how they might interpret what you have written; think of every possible way they might answer the questions; and have your friends read into the questions everything they can and try to misinterpret them as much as possible.

(2) Group together questions dealing with each aspect of the study: list for each subproblem all the questions you need to ask in order to get the necessary data; ask other people to help you think of things to ask; examine the

questions to see if they might be grouped more logically (type of information other than subproblem); and label each group with an appropriate heading.

(3) Arrange questions in either a psychological or logical order: questions should flow from one to the other smoothly; establish rapport by asking easily answered, neutral, interesting questions; put important questions near the beginning (for long questionnaires) rather than the end, and arrange questions from general to specific.

(4) Do not ask for some information because it would be good to have: ask no questions that will seem foolish or unimportant to the respondent; and ask the questions in such a way that their purpose in relation to the problem is evident.

(5) Use an easy-to-answer format: decide on the form the questions should take, that is, open-ended questions, appropriate check-off responses; use the simplest language possible, avoiding technical terms, defining terms or specifying exactly what you mean, and keeping vocabulary free from jargon; and use precise working that asks exactly what you want to know.

(6) Prepare dummy tables of your anticipated responses: plan how the data will be classified, tallied, and summarized into tables: plan all tables completely, making sure all responses can be made into a table.

(7) Design an attractive questionnaire: leave as much "white space" as possible; make the questionnaire as short as

possible; leave adequate space for the answers; line up responses under each other; precode the responses if possible; vary type styles and sizes; title the questionnaire; use professional quality reproduction; and supply clear, complete directions.

(8) Supply clear, complete directions: tell exactly who should answer the questions; indicate how the responses should be indicated; place directions wherever in the questionnaire they will be needed - not necessarily at the beginning; and provide sample response, if it is helpful.

(9) Try out your questions (pilot test): use a small sample; try to answer questions in the most "far out" way possible; read the questions in every way possible; ask for notes and comments about anything that is not clear; word questions two different ways to provide the most useful response; record the time it takes to complete; and repeat as many times as necessary to get the best possible questions.

(10) Write a good cover letter and follow-up reminders: sell the study on the basis of what you feel will be most appealing to the respondent; include an estimate of the time required to complete; give assurance of the confidentiality of the responses; and send follow-up reminders.

The preceding information about questionnaires suggests that the questionnaire has many advantages over other data collection instruments. They are inexpensive, wide-ranging, can be well designed, are simple and clear, are self-administering, and can be made anonymous. Not all investigators are in favor of using the questionnaire.

Isaac and Michael (1990:130) note that "the questionnaire is the most commonly used survey method and often the most sterile or misleading." These same researchers caution that questionnaires should be carefully field tested to eliminate ambiguous or biased items and to improve format, both for ease of understanding and facility in analyzing results. Disadvantages of the questionnaire survey method are that there are no assurances that the questions were understood or that respondents gave truthful responses.

Good and Brophy (1987) discuss the use of the questionnaire as a survey method. They caution that the questionnaire allows for comparisons among individuals or across classes but that question construction is more difficult than it may appear (for example, responses may be affected by how questions are worded). Additionally, responses may not truly represent what students will do in actual situations (validity), and the responses may differ if the questionnaire was given at another time (reliability).

Henderson (1988:32) says, "the first step in questionnaire development is to determine the information desired." Furthermore, questions must be addressed specifically for the desired information. This same author provides the following guidelines to help the questionnaire developer to design questions specifically for certain types of desired information: (1) questions dealing with attitudes often reflect the desirability of something. An example would be "Should adult students be taught like preadult students?" (2) Beliefs are assessments of what people think is true or false. Sometimes these test people's knowledge of facts, and other times they elicit perceptions. An example of a belief question would be: "Do you believe group study is more appropriate for adult students than children?" (3) Assessment of behaviors are generally beliefs about behaviors, and the questions asked directly address what has happened or what might happen. An example would be: "Do you think you would participate in an adult learning workshop if it were offered at NMTC?"

Henderson (1988:32) goes on to say:

> Different kinds of information can be asked in a single questionnaire. However, it is important to be thoroughly clear about the information sought. If you are interested in behavior or behavior change, obviously questions about behavior must be asked, not about attitudes.

Consistent with the thinking of other scholars, this author discusses the importance of using simple words, brevity, specificity, and avoiding biases. Henderson had eight guidelines for developing questionnaires: (1) Make sure the words are uniformly understood; (2) Clarity and brevity may be two important ideas to keep in mind. Some authors suggest that words longer than six to seven letters should not be used, nor questions of more than twenty words; (3) Avoid abbreviations and unconventional phrases (jargon); (4) Avoid vague questions; they often bring vague answers; (5) Make questions as unbiased as possible; (6) Avoid questions that are too demanding; (7) Avoid double questions; and, (8) Make the answer choices mutually exclusive.

Despite the warnings and cautions, it would appear that the questionnaire is the appropriate survey tool to use in an evaluative study. The steps identified in the literature for developing a questionnaire provide a useful basis for revising and updating the Student Questionnaire and Teacher Questionnaire used in this Major Applied Research Project. The foundation for this study, the conceptual framework, follows.

## Conceptual Framework

The revised Kolb (1985) Learning Style Inventory (LSI) is a twelve-item, self-description questionnaire measuring how learners use four different learning modes that are part of a four-stage cycle of learning. Kolb's four learning styles are based on the theories of thinking and creativity, for example Piaget's cognitive theory, and Guilford's structure-of-intellect model. Following is a synopsis of Kolb's four learning styles as described by Brudenell and Carpenter (1990:81).

> The converger relies on the learning abilities of abstract conceptualization and active experimentation. Problem-solving, decision-making, and practical application of ideas are considered strengths. The learner with this style does best when there is one correct answer to a problem. Rather than social or interpersonal issues, this person likes technical tasks and problems.

The diverger relies on concrete experience and reflective observation. The greatest strength is in imaginative ability and awareness of meaning and values. The diverger views concrete situations from several perspectives and organizes relationships into a meaningful gestalt, preferring to observe rather than take action. The diverger is a person-oriented individual who is emotional and does well in brainstorming.

The assimilator relies on abstract conceptualization and reflective observation. Inductive reasoning and ability to create theoretical models are strengths. Assimilators are more focused on ideas and abstract concepts than on people or the practical values of the theories that are developed.

The accommodator relies on concrete experience and active experimentation. Doing things, carrying out plans and tasks, and getting involved in new experiences are strengths. The accommodator works best in situations where adaptation to immediately changing situations is required.

Kolb's learning styles are useful for determining how to engineer the learning environment that best meets the learning needs of students of all ages. Validity for the LSI has been established through many studies. Locus of control, a personality variable, is also believed to have a great deal to do with the way an individual learns.

Locus of control (Rotter, 1966; Findley and Cooper, 1983) refers to a person's beliefs about control over life events. Some people feel responsible for the things in life that happen to them. They have an internal locus of control, whereas others feel that the outcomes in life are determined by forces beyond their control such as fate, luck, God, or powerful others. These people are said to have an external locus of control or external control.

The construct, locus of control, has generated numerous studies among a variety of populations (college students, males, females, minorities, children) as well as various studies involving trade and technical students (Levine, 1978; Rahr, 1980; Sanchez, 1983, Stevens, 1982; Linares, 1989). According to some theorists, the processes an individual uses to cope with stress also has a great deal to do with the way in which an individual learns.

Many psychologists theorize how people cope with stress (for example, Seligman, Selye, and Freud). The essence of what these experts say is that many techniques for coping with stress are essentially defensive. They reduce the immediate impact of the stressor, but at some personal or social cost (Rathus, 1987). The cost includes socially inappropriate behavior (as in alcoholism, aggression, or regression), avoidance of problems (as in withdrawal), or self-deception (as in use of defense mechanisms like rationalization or denial). Defensive coping grants individuals the time to marshal resources, but it does not deal with the source of stress or improve the effectiveness of an individual's response to stress.

Rathus contends that direct or active coping begins with accepting responsibility for one's own behavior, including thoughts and emotional responses. It includes manipulating the environment to change or eliminate sources of stress. The way that individuals cope with stress has a lot to do with their basic personality. Personality affects who individuals are and what they do with their lives. Several psychologists believe that the choice of a vocation is an expression of personality.

Holland (1973) believes that because people in a vocational group have similar personalities they will respond to many situations and problems in similar ways and that they will create characteristic interpersonal environments. He further contends that people search for environments that will let them exercise their skills and abilities, express their attitudes and values, and take on agreeable problems and roles.

Holland describes six personality types: realistic, investigative, artistic, social, enterprising, and conventional. Holland's Theory of Vocational Choice provides a framework for comparing the personalities of instructors and the instructional methods predominantly used.

The theories and concepts pertaining to coping processes, personality and vocation, learning style, and locus of control forms the foundation for this study. The instruments used in this study are grounded in the conceptual and theoretical tenants of the above framework.

# Chapter 3

## METHODOLOGY AND PROCEDURES

The purpose of this evaluative investigation was to describe systematically the facts and characteristics of NMTC's faculty and students with respect to teaching and learning and to determine appropriate instructional improvement strategies for possible implementation at NMTC. This study employed the case-study research methodology, using the following procedures: (1) an extensive review of the related literature was conducted; (2) a conceptual framework was developed for the study; (3) the Student Questionnaire and the Faculty Questionnaire, developed by Drummond and Sutton (1978), were revised and updated; (4) the questionnaires were administered to NMTC's students and faculty in order to gather data on selected characteristics and teaching/learning preferences; (5) information from personnel from five colleges/universities in the United States and Canada was obtained in an effort to review current practices and procedures utilized in successful instructional improvement programs; (6) study results were analyzed, interpretations offered, conclusions drawn, and recommendations outlined; and (7) an unabridged copy of the report will be presented to NMTC's president.

Two separate computer searches of the ERIC (Educational Resources Information Center) abstracts spanning the period from 1970 until the present date revealed that 217 articles pertained to adult development, adult learning theory and principles, questionnaire development, and instructional improvement programs. Based on a review of the abstracts, documents that appeared particularly useful for the study were obtained. In addition to the Nova University Information Retrieval Service computer searches, local libraries and the University of Maine's interlibrary loan service provided relevant books, program descriptions, evaluation reports, journal articles, and research reports.

The conceptual framework for the study originated from the philosophical undergirdings of the survey instruments and the variables under investigation. The technical manuals accompanying the instruments provided much of the information needed to piece together a coherent conceptual foundation for the study. Additionally, concepts such as "locus of control" are discussed extensively in the psychosocial literature: thus, this information was obtained from numerous texts and journal articles on file in local libraries.

Both Drummond and Sutton provided many suggestions for improving and updating the student and teacher questionnaires originally developed by them in 1978. The modifications suggested by these researchers were implemented, as were the changes deemed appropriate by the investigator after reviewing the literature pertaining to questionnaire development and administration. Draft one of the questionnaires was forwarded to Donald Busche, an educator with extensive experience relative to questionnaire development and administration from Saddleback Community College, California. Numerous suggestions for improving the questionnaires were made by Busche and all recommendations were implemented.

Draft two of the questionnaires was then forwarded to two social science professors (Schmidt and Morris) at the University of Maine, Presque Isle. These professors made suggestions for two minor changes to the questionnaires, both of which were implemented. A copy of the revised questionnaires used can be found in Appendix A.

## Subjects

The faculty sample consisted of thirty-six of NMTC's full-time faculty. Nine respondents were female and twenty-seven were male. All respondents taught during the day, although a few faculty taught one or more evening courses in addition to their usual day-time classes. Six respondents taught in the nursing program, nine taught in the business program, sixteen taught in the trade and technical program, and five taught general education courses.

All student respondents carried at least twelve credit hours per semester and were matriculated in one of NMTC's nineteen programs of study. In addition, the students were day-time students and attended classes on the main campus. The student sample consisted of ninety-nine males and one hundred and ten females.

## Data Collection Procedures

Faculty respondents completed the teacher survey during the February faculty forum. The academic dean granted permission, in writing, to administer the questionnaires the faculty and students. A copy of the permission letter can be found in Appendix B.

The investigator explained the objectives of the study and the procedure for completing the questionnaire, both orally and in writing. Faculty respondents were told that participation was voluntary and that questionnaires were to be completed anonymously. Additionally, faculty were told that the data used for this research would not be used for any other reason except that for which it was intended. For example, the data would not be used for performance evaluation. Faculty were told that the report would be submitted for possible publication and that the institution would be identified. The investigator remained in the room while respondents completed the questionnaire in order to address faculty concerns and to collect the completed questionnaires.

Those faculty not in attendance at the faculty forum were contacted individually by the investigator, over a three day period, and asked to complete the questionnaire. The information provided to these faculty members was identical to that described above. Completed questionnaires were returned directly to the investigator.

Six full-time faculty members were off campus during the three day period the faculty data was collected; one nursing instructor, three general education instructors, one business instructor, and one trade and technical instructor. Additionally, six nursing faculty chose not to complete the teacher questionnaire. Out of NMTC's forty-eight full-time faculty, thirty-six faculty completed the questionnaire and twelve faculty did not participate in the study.

The dean requested that classroom instructors administer the student surveys during regularly scheduled class periods. The investigator explained the objectives of the study and the procedure for completing the questionnaire to four faculty members agreeing to administer the questionnaires to their students. Faculty agreeing to administer the surveys were those teaching courses to a diverse population of students, thus insuring student representation from all of NMTC's programs. Because the investigator teaches nursing, questionnaires were administered to NMTC's practical nursing students by the investigator.

Students were asked to participate in the study on a voluntary basis and were instructed not to put their names on the questionnaires as they were to be turned in anonymously. The instructors administering the surveys acknowledged the students' right to refuse to participate in the study, explaining that students refusing to participate would not be penalized in any way. Students were told that the data resulting from the completed questionnaires was to be used for research on teaching and learning that was being conducted by an NMTC instructor working on her doctorate. Out of the approximately 300 students asked to complete the questionnaire, 243 volunteered to fill out the questionnaires. Out of the 243 questionnaires completed, 209 were usable. Thirty-four questionnaires were incomplete, not readable, or contained information other than that requested.

Instructional improvement information was obtained from five post-secondary institutions in the United States and Canada. The following individuals provided information: Edward Nuhfer, University of Wisconsin; Diane Morrison, Center for Curriculum and Professional Development, British Columbia, Canada; Arthur B. Cordova, Albuquerque Technical-Vocational Institute, Albuquerque, New Mexico; J. Baker, Scott Community College, Indiana; and Nancy Hartley, Colorado Community College, Denver, Colorado.

The majority of the personnel contacted were from two-year schools, were members of the National Council for Staff, Program and Organizational Development (NCSPOD), and had documented expertise in the area of adult teaching/learning. The information provided by the aforementioned personnel was reviewed and relevant information was summarized and presented in the literature review portion of this study.

## Instruments

Two questionnaires were used in this study. The first was the Teacher Questionnaire, a two-page questionnaire, consisting of twenty-three items relating to types of teaching techniques. Faculty were asked to respond to each of the twenty-three items on a four point Likert scale: (1) not used, (2) seldom used, (3) moderately used, and (4) frequently used. Space was provided for respondents to include other techniques not listed on the original list. In addition, there were three questions relating to teaching methods:

1. Which of the above teaching techniques do you believe have been most beneficial in assisting students to learn effectively? Identify the number(s) from the above list corresponding to the technique(s) of your choice.

2. Please describe a specific illustration of one of your successful teaching experiences.

3. Are you trying any type of new or innovative way of teaching a course or courses? Please describe the technique or approach you are using.

The Student Questionnaire completed by students consisted of three parts. The first consisted of the following seven demographic questions: program of study, grade point average, age, gender, portion of program completed, marital status, and work status. The second part of the survey consisted of thirty-two items describing learning techniques. Students were asked to rate the techniques relative to how helpful a particular technique was in assisting them to learn. Students were asked to respond to each item on a five point Likert scale from "hinders or prevents learning" to "is extremely helpful." The students were then asked the following question: Which two learning techniques are the BEST for helping you to learn?

The third part of the questionnaire consisted of one of three instruments: the Rotter (1982) Locus of Control Scale, the Kolb (1985) Learning Style Inventory, and the Folkman and Lazarus (1988) Ways of Coping Questionnaire. The surveys completed by students included only one of these three instruments in an effort to keep testing time at a minimum. Each class of students surveyed was given one of the three instruments along with the remainder of the Student Questionnaire in an effort to make administration easier.

The original Student Questionnaire and the Teacher Questionnaire (Drummond and Sutton, 1978), were based on the Ways of Learning questionnaire developed by Drummond (1973). This instrument was used to assess student reaction to teaching/learning activities in schools. The items were modified to reflect the techniques used in the Maine Vocational Technical Institutes and to correlate with the items included on the instructor's scale.

The Internal/External Control Scale (Rotter, 1982), originally developed by Rotter in 1966, consisted of twenty-nine paired comparison statements. Internal statements are paired with external statements and respondents are asked to select the one statement from each pair which best represents how they feel. Respondents select the one statement that they actually believe to be more true, rather than the one they think should be chosen or the ones they wish were true. The statements are measures of personal belief; obviously there are no right or wrong answers. One point is given for each external statement selected. Scores are determined on-site and can range from zero (most internal) to a high of twenty-three (most external). If individuals believe that events impacting their life are dependent upon their own behavior, they have an internal locus of control. If they believe that events impacting their life are the result of luck, fate, chance, or God, they have an external locus of control. The test retest reliabilities ranged from .60 to .83 (Rotter, 1982).

Kolb's (1985) Learning Style Inventory (LSI) was used to identify students' preferred learning styles. The LSI is a twelve-item, self-description instrument that asks respondents to rank order four ways that best describe their learning styles. The LSI measures respondents relative emphasis on four learning approaches and provides a combination score that indicates the extent to which they emphasize concreteness over abstractness and action over reflection. Split half reliability of an average of eighty-two percent has been established using the Spearman Brown prophecy formula for five groups. Validity for the LSI has been established through several studies that have correlated the inventory with the Thematic Apperception Test (TAT), the FIRO-B, and the Myers Briggs Type Indicator (Brudenell and Carpenter, 1990). The LSI, which was scored on-site, can also be mailed to the publisher (McBer) for scoring.

The third instrument, the Ways of Coping Questionnaire (Folkman and Lazarus, 1988) assesses thoughts and actions individuals use to cope with the stressful encounters of everyday living. It is derived from a cognitive, phenomenology theory of stress and coping.

> The questionnaire has been used primarily as a research instrument in studies of the coping process. Researchers have used it to investigate the components and determinants of coping in a variety of studies (Folkman and Lazarus, 1988:1).

The internal consistency of the coping measures, estimated with Cronbach's coefficient alpha show coefficients for the eight scales on the questionnaire ranging from sixty-one percent to seventy-nine percent. These coefficients are "higher than alphas reported for most other measures of coping processes" (Folkman and Lazarus, 1988:13).

Items on the questionnaire were designed to be answered with a specific stressful encounter in mind. "Defining the focal encounter is critical to the proper administration of the Ways of Coping Questionnaire (Folkman and Lazarus, 1988:10). The investigator can select the focal encounter or the respondent can be instructed to choose a personal focal encounter. The instruction manual provides instructions for the investigator that have proved effective in assisting individuals to focus on one particular episode.

The tests, which were scored on-site, can also be mailed to the publisher (Consulting Psychologists Press) for scoring.

> Individuals respond to each item on a four-point Likert scale, indicating the frequency with which each strategy is used: 0 indicates "does not apply and/or not used," 1 indicates "used somewhat," 2 indicates "used quite a bit," and 3 indicates "used a great deal" (Folkman and Lazarus, 1988:11).

"The Ways of Coping Questionnaire can generally be completed in about ten minutes, although the time will vary with respondents" (Folkman and Lazarus, 1988:9).

## Data Analysis

The responses to the twenty-three items on the teacher survey were presented using the means and standard deviations of faculty's responses to the frequency of use for each teaching technique. The techniques were rank ordered according to means from highest to lowest. Faculty were classified by their instructional area using Holland's six personality types: realistic, investigative, artistic, social, enterprising, and conventional. After computing the mean for each group of faculty falling within the various personality type classifications, a comparison of personality type and instructional techniques was conducted, using the one-way analysis of variance. Significance level was set at .05 for all inferential tests.

The faculty sample was divided into three groups according to years of teaching experience in all fields and levels at the upper and lower quartiles to see if differences existed in the use of instructional methods by years of teaching experience. A one-way analysis of variance was used to compare instructional techniques by years of experience.

The faculty sample was grouped into the general categories of nursing, business technology, trade and technical, and general education, in order to compare teaching styles by program classification. The responses of the four groups of faculty to the list of twenty-three teaching techniques by type of program was analyzed using a one-way analysis of variance.

The faculty were asked to indicate which of the twenty-three teaching techniques were most beneficial in assisting students to learn effectively. These responses were categorized and tallied. The techniques were then presented in rank order.

The responses to the second question, asking faculty to describe a specific illustration of one of their most successful teaching techniques, were edited and a sample of the techniques is included in Appendix C of this report. Illustrations were not classified or analyzed.

The responses to the third question, asking faculty to describe a new or innovative technique they were currently trying, were edited and a sample of the techniques is included in Appendix D. No attempt was made to classify or analyze the illustrations offered by faculty.

The distribution of the student sample by NMTC's nineteen programs of study were presented by dividing the nineteen programs into the following three general categories: nursing, trade and technical, and business technology. Numbers of students in each category were presented by number and percent of the total sample. Other demographic data, such as age, grade point average, and marital status, were presented using descriptive statistics.

The students were asked to respond to a thirty-two item ways of learning inventory on the student survey. The responses were given on a five point Likert scale ranging from "hinders learning," to "extremely helpful" for learning. A rank order of the thirty-two learning techniques based on the means and standard deviations derived from students' responses to the frequency of use scale was presented.

Responses were analyzed according to the variable of gender. The results of the evaluation of NMTC students to teaching/learning techniques by gender was presented after determining means for the two groups, male and female, and using the $t$ test.

The sample was initially divided into three groups: students who were between seventeen and twenty-two years old; students who were twenty-three years to fifty-five years old; and students over fifty-five years of age. Because there were no students over the age of fifty-five years in the resultant student sample, only two age categories were available for comparison. The $t$ test was used to determine differences by age in the preferred learning techniques of students.

The sample was divided into four groups based on marital status: single, married, divorced, and widowed. An evaluation of students to teaching/learning techniques by marital status using the one-way analysis of variance was conducted. Because none of the 209 students in the resultant sample indicated a "widowed" status, the following three groups were used for comparison purposes: single, married, and divorced.

It was determined from the questionnaire results whether students had ever been employed outside of the home. An evaluation of students to teaching/learning techniques by work status was conducted using the one-way analysis of variance. Additionally, the analysis of variance was used to evaluate students to teaching/learning techniques by the portion of their program completed at NMTC.

Students indicated whether their grade point average was below 2.0, 2.0 - 2.9, or 3.0 or above. Evaluation of students to teaching/learning techniques by the three categories of grade point average was conducted using the one-way analysis of variance.

Student responses to the Internal/External Control Scale were categorized into one of three groups: internal, middle, and external. The responses on the ways of learning inventory of the student questionnaire were compared to each of the three groups using the one-way analysis of variance.

An evaluation was conducted of students to teaching/learning techniques by the four learning styles on Kolb's Learning Style Inventory: converger, diverger, assimilator, and accommodator. Students were divided into four groups according to their predominant learning style and a one-way analysis of variance was computed.

Because the Ways of Coping Questionnaire consisted of eight subscales and generated a score for each of these subscales, the highest score out of the eight scores generated by each respondent was considered, indicating which coping process the individual used most frequently. In essence, there were eight separate variables, but only one of the eight variables was relevant to each respondent. The student sample was separated into eight groups based on the most frequently used coping process. A one-way analysis of variance was computed in order to evaluate students to teaching/learning techniques by the eight groups of coping processes.

The students were asked on the questionnaire what other learning techniques were helpful to their learning. Students' actual responses were summarized and are presented in Appendix E. Responses were listed in no particular order. If a response was listed by more than one student, that response was listed only once in order to minimize space and to prevent redundancy.

The students were asked which two learning techniques were the best for helping them to learn. The responses were analyzed and tallied. The top ten techniques were rank ordered and presented according to NMTC's three major areas of study: nursing, trade and technical, and business technology. Lastly, a table comparing a rank listing of the common teaching/learning techniques by faculty and students is presented in table form.

## Chapter 4

# PRESENTATION OF RESULTS

### Preferred Teaching Techniques

Faculty's responses to the twenty-three teaching techniques listed on the Teacher Questionnaire were analyzed, after determining the means and standard deviations for each technique, and ultimately rank ordered from highest to lowest. Table 1 (p. 66) presents a rank order of faculty's preferred instructional techniques.

Collectively, faculty preferred the lecture as an instructional technique, rating this technique the highest. Following the lecture, the nine techniques that faculty viewed as helpful to students' learning, in order from most preferred to least preferred were as follows: written exams, questioning students, homework assignments, demonstrations, teacher led discussions, review sessions, practical exams, laboratory/shop, and audio-visuals.

The ten techniques to which faculty assigned the lowest ratings, from least favored to most favored, were as follows: panel presentation/debate, role-play, independent study, student presentation, programmed instruction, field trips, library or research papers, computer aided instruction, small group study, and student led discussion.

## Table 1

## Rank Order of Faculty's Preferred Instructional Techniques

| Rank | Technique | $\bar{X}$ (n=36) | SD |
|---|---|---|---|
| 1 | Lecture | 2.86 | .35 |
| 2 | Written Exams | 2.72 | .57 |
| 3 | Questioning Students | 2.69 | .48 |
| 4 | Homework | 2.58 | .77 |
| 5 | Demonstration | 2.53 | .65 |
| 6 | Discussion, Teacher Led | 2.44 | .65 |
| 7 | Review Sessions | 2.22 | .76 |
| 8 | Practical Exams | 2.17 | 1.03 |
| 9 | Laboratory/Shop | 2.14 | 1.20 |
| 10 | Slides/Filmstrips/Videos | 1.89 | .92 |
| 11 | Individualized Instruction | 1.69 | .92 |
| 12 | Peer Teaching | 1.50 | 1.00 |
| 13 | "On the Job" Training | 1.50 | 1.34 |
| 14 | Discussion, Student Led | 1.44 | .88 |
| 15 | Small Group Study | 1.39 | .73 |
| 16 | Computer Aided Instruction | 1.25 | .97 |
| 17 | Library or Research Papers | 1.22 | .83 |
| 18 | Field Trips | 1.17 | 1.00 |
| 19 | Programmed Instruction | 1.17 | 1.11 |
| 20 | Student Presentation | 1.06 | .89 |
| 21 | Independent Study | 1.00 | .68 |

Table 1 (Cont.)

Rank Order of Faculty's Preferred Instructional Techniques

| Rank | Technique | $\bar{X}$ (n=36) | SD |
|---|---|---|---|
| 22 | Role-Play | .83 | .85 |
| 23 | Panel Presentation/Debate | .47 | .65 |

## Evaluation by Holland's Personality Types

As is evident in Figure 1, faculty were assigned to classifications according to instructional area using Holland's six personality types: realistic, investigative, artistic, social, enterprising, and conventional. Appendix F lists Holland's personality types and the characteristics of each type as described by Drummond and Sutton (1978:166-168).

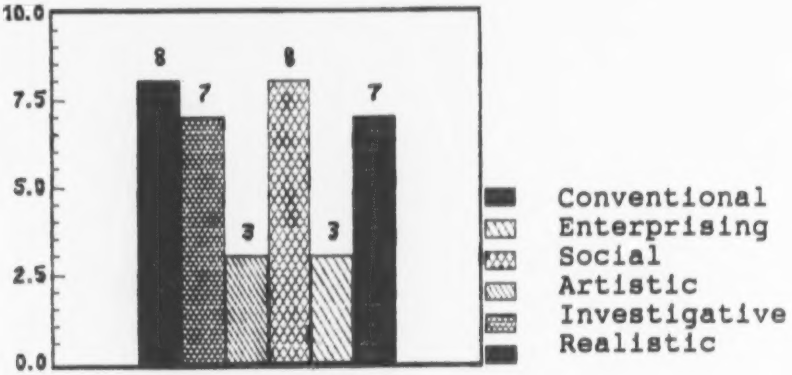

Figure 1

Classification of Faculty by Holland's Personality

Table 2 (p. 69) presents an evaluation of faculty's preferred instructional techniques by Holland's six personality types, using the one-way analysis of variance. There was a significant difference in the way that faculty viewed student led discussion. Faculty classified as realists tended to give higher ratings to student led discussion than did those classified as artistic.

Student presentations was another technique viewed differently depending upon personality type. Faculty classified as social favored this technique; whereas faculty classified as conventional assigned the lowest ratings to this technique. The enterprising and conventional personality types did not view slides/filmstrips/videos as favorably as the other groups. In fact, these groups gave nearly identical ratings to this technique.

The realists viewed individualized instruction as beneficial to students' learning; however, the group with the social personality gave low ratings to this technique. The realists and socials rated high the instructional technique of written exams, whereas the enterprising group gave this technique a low rating. The conventional group did not favor peer teaching or laboratory/shop, whereas the investigative types favored both. Of the six groups, the realists assigned the highest ratings to the laboratory/shop technique.

## Table 2

## Evaluation of Faculty's Preferred Instructional Techniques by Holland's Personality Types

| Technique | R (n=8) | I (n=7) | A (n=3) | S (n=8) | E (n=3) | C (n=7) | F |
|---|---|---|---|---|---|---|---|
| 1 Lecture | 3.00 | 2.86 | 2.33 | 3.00 | 2.67 | 2.86 | 2.48 |
| 2 Discussion, Student Led | 2.25 | 1.57 | 0.67 | 1.13 | 1.00 | 1.29 | 2.87 |
| 3 Discussion, Teacher Led | 2.75 | 2.86 | 2.67 | 2.13 | 2.00 | 2.14 | 2.31 |
| 4 Small Groups | 1.38 | 1.71 | 1.00 | 1.63 | 1.67 | 0.86 | 1.57 |
| 5 Student Presentation | 1.00 | 1.14 | 0.67 | 1.75 | 1.33 | 0.29 | 2.75 |
| 6 Panel Presentation/Debate | 0.63 | 0.71 | 0.33 | 0.50 | 0.67 | 0.00 | 1.11 |
| 7 Questioning Students | 2.88 | 2.57 | 2.67 | 2.75 | 2.67 | 2.57 | 0.42 |
| 8 Review Sessions | 2.88 | 2.14 | 2.00 | 1.88 | 2.00 | 2.14 | 1.85 |
| 9 Audio-Visuals | 2.63 | 1.71 | 2.00 | 2.38 | 1.00 | 1.00 | 5.68 |
| 10 Programmed Instruction | 1.88 | 1.29 | 1.00 | 0.75 | 1.33 | 0.90 | 1.19 |
| 11 Demonstration | 3.00 | 2.57 | 2.00 | 2.25 | 2.00 | 2.71 | 2.44 |
| 12 Computer Instruction | 1.13 | 2.14 | 1.33 | 1.00 | 1.33 | 0.71 | 2.02 |
| 13 Field Trips | 2.00 | 1.14 | 1.00 | 1.13 | 1.00 | 0.43 | 2.25 |
| 14 Independent Study | 1.13 | 1.14 | 1.00 | 0.75 | 1.33 | 0.86 | 0.51 |
| 15 Individualized Instruction | 2.63 | 1.71 | 1.67 | 1.00 | 1.67 | 1.43 | 3.69 |
| 16 Homework | 2.88 | 3.00 | 1.67 | 2.25 | 2.67 | 2.57 | 2.07 |

Table 2 (Cont.)

Evaluation of Faculty's Preferred Instructional Techniques by Holland's Personality Types

| Technique | R (n=8) | I (n=7) | A (n=3) | S (n=8) | E (n=3) | C (n=7) | F |
|---|---|---|---|---|---|---|---|
| 17 Research Papers | 1.50 | 1.00 | 0.67 | 1.25 | 2.00 | 1.00 | 1.21 |
| 18 Practical Exams | 3.00 | 2.29 | 2.33 | 1.63 | 2.33 | 1.57 | 2.42 |
| 19 Written Exams | 3.00 | 2.71 | 2.33 | 3.00 | 2.00 | 2.57 | 2.62 |
| 20 Peer Teaching | 1.75 | 2.29 | 1.00 | 1.75 | 1.00 | 0.57 | 3.48 |
| 21 Laboratory/ Shop | 3.00 | 2.86 | 2.33 | 2.13 | 1.33 | 0.71 | 6.32 |
| 22 "On the Job" Training | 2.13 | 1.71 | 0.00 | 1.88 | 1.33 | 0.86 | 1.76 |
| 23 Role-Play | 1.00 | 0.71 | 0.67 | 0.75 | 2.00 | 0.43 | 1.77 |

R=Realistic; I=Investigative; A=Artistic; S=Social; E=Enterprising; C=Conventional

Underlined F-Ratios values indicates significance at or beyond the .05 level

### Evaluation by Years of Teaching Experience

As can be seen in Figure 2 (p. 71), the faculty sample was divided into three groups according to their years of teaching experience in all fields and levels. The sample was divided at the upper and lower quartiles to see if use of instructional methods varied according to years of teaching experience.

A one-way analysis of variance was used to compare faculty's use of instructional techniques with their years of teaching experience. There were no significant differences in the preferred instructional techniques of NMTC's faculty respondents based on years of teaching experience.

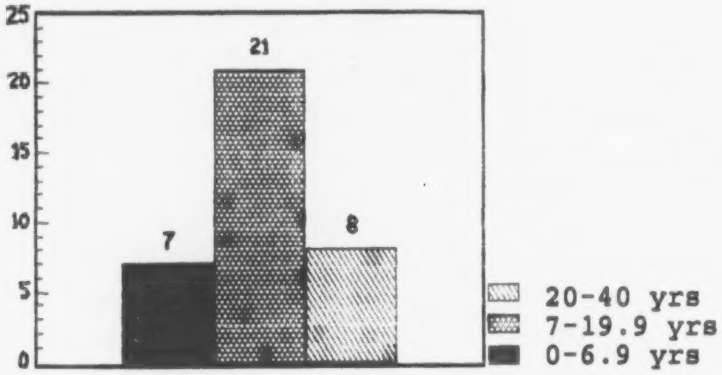

Figure 2

Years of Teaching Experience

## Evaluation by Academic Department

The faculty sample was grouped into the general categories of nursing, business technology, trade and technical, and general education, in order to compare teaching styles by program category. Six faculty taught in the nursing department, nine faculty taught in the business technology department, sixteen faculty taught in the trade and technical department, and five faculty taught in the general education department.

Table 3 (p. 72) shows an evaluation of faculty's preferred instructional techniques by academic department. A one-way analysis of variance was used to compare instructional techniques and academic department. There were significant differences in the views the four groups of faculty held about six of the instructional techniques.

## Table 3

## Evaluation of Faculty's Preferred Instructional Techniques by Academic Department

| Technique | Nursing (n=6) | Business (n=9) | Trade & Technical (n=16) | General Education (n=5) | F |
|---|---|---|---|---|---|
| 1 Lecture | 3.00 | 2.89 | 2.81 | 2.80 | 0.46 |
| 2 Discussion, Student Led | 1.17 | 1.22 | 1.81 | 1.00 | 1.90 |
| 3 Discussion, Teacher Led | 2.33 | 2.22 | 2.69 | 2.20 | 1.43 |
| 4 Group-Study | 1.67 | 1.33 | 1.44 | 1.00 | 0.79 |
| 5 Student Presentation | 1.83 | 0.78 | 1.06 | 0.60 | 2.54 |
| 6 Panel Presentation/Debate | 0.67 | 0.33 | 0.63 | 0.00 | 1.54 |
| 7 Questioning Students | 2.67 | 2.56 | 2.81 | 2.60 | 0.66 |
| 8 Review Sessions | 1.83 | 2.00 | 2.56 | 2.00 | 2.20 |
| 9 Audio-Visuals | 2.67 | 0.89 | 2.38 | 1.20 | 18.60 |
| 10 Programmed Instruction | 0.50 | 0.89 | 1.75 | 0.60 | 3.41 |
| 11 Demonstration | 2.17 | 2.44 | 2.69 | 2.60 | 1.00 |
| 12 Computer Aided Instruction | 1.17 | 1.33 | 1.31 | 1.00 | 0.16 |
| 13 Field Trips | 1.33 | 0.78 | 1.63 | 0.20 | 4.01 |
| 14 Independent Study | 2.17 | 2.44 | 2.69 | 2.60 | 1.00 |
| 15 Individualized Instruction | 1.17 | 1.56 | 2.19 | 1.00 | 4.04 |

Table 3 (Cont.)

Evaluation of Faculty's Preferred Instructional Techniques by Academic Department

| Technique | Nursing (n=6) | Business (n=9) | Trade & Technical (n=16) | General Education (n=5) | F |
|---|---|---|---|---|---|
| 16 Homework | 2.17 | 2.89 | 2.69 | 2.20 | 1.66 |
| 17 Research Papers | 1.17 | 1.11 | 1.31 | 1.20 | 0.12 |
| 18 Practical Exams | 1.33 | 2.33 | 2.56 | 1.60 | 3.20 |
| 19 Written Exams | 3.00 | 2.44 | 2.75 | 2.80 | 1.28 |
| 20 Peer Teaching | 2.00 | 0.89 | 1.75 | 1.20 | 2.35 |
| 21 Laboratory/Shop | 2.83 | 1.56 | 2.63 | 0.80 | 6.31 |
| 22 "On the Job" Training | 2.50 | 1.00 | 1.50 | 1.20 | 1.71 |
| 23 Role-Play | 0.83 | 1.00 | 0.94 | 0.20 | 1.15 |

Underlined F-Ratios values indicates significance at or beyond the .05 level

Nursing instructors viewed slides/filmstrips/videos more helpful to students' learning than did the business technology department. In fact, the differences in the way the groups viewed this instructional technique was significant at a level of <.0001. The trade and technical instructors assigned programmed instruction a high rating; however, none of the other three groups assigned a high rating to this technique.

The general education instructors, followed closely by the business technology instructors, did not place high value on field trips. The trade and technical instructors and the nursing instructors responded to this technique in much the same way. The trade and technical instructors took the lead in viewing individualized instruction as beneficial to students' learning.

The trade and technical instructors and the business instructors perceived practical examinations to be more helpful to students' learning than did the other two groups. Nursing instructors and trade and technical instructors favored laboratory/shop more than did business instructors and general education instructors. The general education instructors assigned a particularly low rating to this technique.

## Most Successful Teaching Techniques

Faculty were asked to indicate on the questionnaire which of the twenty-three teaching techniques were most beneficial in assisting students to learn effectively. These responses were categorized, tallied, and the ranks of the ten most frequently used techniques are presented in Table 4 (p. 75).

The responses to the second question, asking faculty to describe a specific illustration of one of their most successful teaching techniques, were edited and a sample of the techniques is included in Appendix E of this report. Illustrations were not classified or analyzed.

Faculty's responses to the third question, asking them to describe a new or innovative technique they were currently

Table 4

Rank Order of Faculty's Most Successful Teaching Techniques

| Technique | Rank |
|---|---|
| Lecture | 1 |
| Laboratory/Shop | 2 |
| Demonstration | 3 |
| Discussion, Teacher Led | 4 |
| "On the Job" Training | 5 |
| Practical Exams | 6 |
| Homework | 7 |
| Questioning Students | 8 |
| Written Exams | 9 |
| Slides/Filmstrips/Videos | 10 |

trying, were edited and a sample of the techniques is included in Appendix F. No attempt was made to classify or analyze the illustrations offered by faculty. Twenty-two out of thirty-six respondents identified a new or innovative way of teaching. Faculty were asked if they wished to give their name so that they could receive credit for the technique in this report. Those faculty signing their names to this question were given credit for their new or innovative technique.

The lecture was the most successful instructional technique in the eyes of faculty. Next came the applied learning techniques of lab, shop, demonstration, and "on the job" training. The second major means of presenting information to students was teacher led discussion and questioning students.

Evaluation methods such as practical and written exams, and homework ranked next in priority. Ranking tenth was the use of audio-visuals. This marked the third major technique for providing information to students.

By department, faculty responses look a bit differently. The techniques reported to be most successful by the nursing faculty was the lecture and "on the job" training. The business technology department reported that teacher led discussion and practical examinations were the most successful techniques for teaching business students.

The trade and technical faculty believed the lecture, demonstration, and the laboratory/shop to be the best learning experience for their students. Lastly, the general education faculty viewed the lecture and questioning students as the most effective ways of teaching students general education content.

## Student Demographic Data

As can be seen in Table 5 (p. 77), of the 209 student respondents, programs of study were reported that cut across NMTC's three general academic areas of nursing, trade and technical, and business technology. Eighteen and sixty-six one-hundreds percent of the respondents claimed a business major; thirty-five and eighty-nine hundreds percent claimed a nursing major; and forty-five and forty-five hundreds percent claimed a trade and technical major.

Table 5

Number and Percent of Students
by General Academic Area

|  | Academic Area | Number | Percent |
|---|---|---|---|
| 1. | Business Technology | 39 | 18.66 |
| 2. | Nursing | 75 | 35.89 |
| 3. | Trade & Technical | 95 | 45.45 |
|  | Totals | 209 | 100.00 |

The student survey asked students to indicate whether they were between seventeen and twenty-two years of age; twenty-three and fifty-five years of age; or over fifty-five years of age. Because all students reported ages of fifty-five years and under, the category of mature students (over fifty-five years) was omitted from the study. As can be seen in Table 6 (p. 78), fifty-four and seven one-hundreds percent of respondents were between the ages of seventeen and twenty-two, and forty-five and ninety-three hundreds percent of respondents reported being between twenty-three and fifty-five years old.

## Table 6

### Number and Percent of Students by Age

| Years of Age | Number | Percent |
|---|---|---|
| 1. 17 - 22 | 113 | 54.07 |
| 2. 23 - 55 | 96 | 45.93 |
| Totals | 209 | 100.00 |

Figure 3 shows that the male/female ratio of respondents was close. Fifty-two and sixty-three hundreds percent of student respondents were female, and forty-seven and thirty-seven hundreds percent of respondents were male.

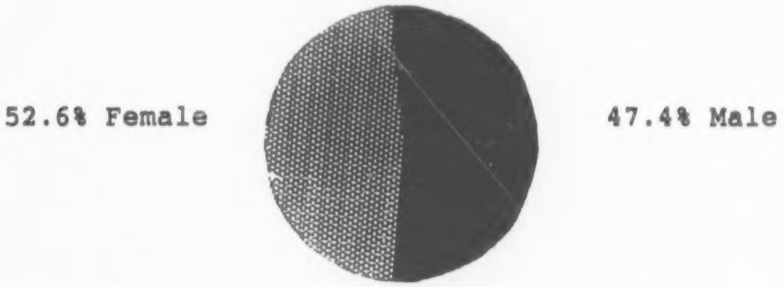

Figure 3

Gender of Students

Figure 4 (p. 79) shows the number and percent of students according to marital status. Initially, students were divided into four groups: single, divorced, married, and widowed. Because the students responses fell into the first three groups, the widowed group was omitted.

Sixty-one and seventy-two hundreds percent of respondents claimed single status; eight and sixty-one hundreds percent of respondents claimed divorced status; and twenty-nine and sixty-seven hundreds percent of respondents claimed they were married.

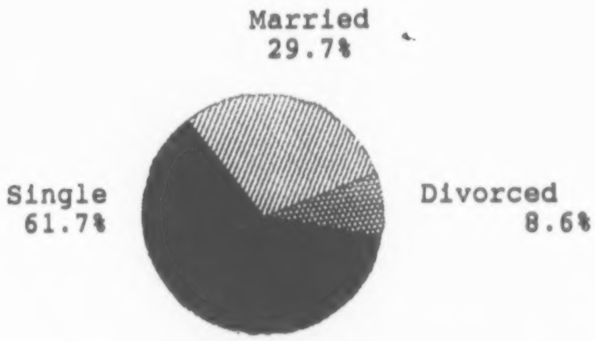

Figure 4

Marital Status of Students

Table 7 shows the grade point averages of students by number and percent of students in the total sample.

Table 7

Number and Percent of Students by Grade Point Average

| | Grade Point Average | Number | Percent |
|---|---|---|---|
| 1. | Below 2.0 | 8 | 3.83 |
| 2. | 2.0 - 2.9 | 105 | 50.24 |
| 3. | 3.0 and Above | 96 | 45.93 |
| | Totals | 209 | 100.00 |

Respondents were asked to indicate their grade point average by placing a check mark in one of the three areas: below 2.0; 2.0 - 2.9; and 3.0 and above. Three and eighty-three hundreds percent of respondents reported a grade point average below two (on a four-point scale); fifty and twenty-four hundreds percent of respondents reported a grade point average between two point zero and two point nine; forty-five and ninety-three hundreds percent of respondents reported a grade point average of three point zero and above.

Ten and five hundreds percent of respondents reported having completed less than one-quarter of their program of study at NMTC. Nineteen and sixty-two hundreds percent of respondents reported having completed between one-quarter and one-half of their program. Forty-two and fifty-eight hundreds percent of respondents reported having completed between one-half and three-quarters of their program of study. Lastly, twenty-seven and seventy-five hundreds percent of students reported having completed over three-quarters of their program.

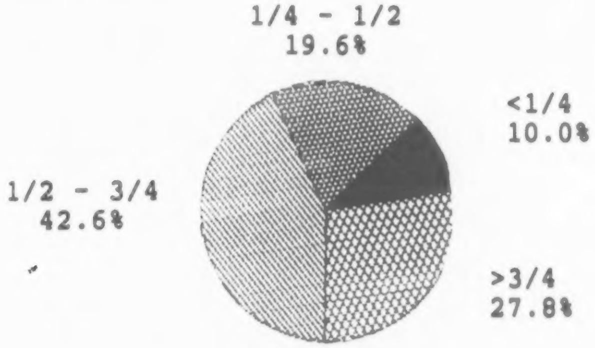

Figure 5

Portion of Program Completed

Figure 5 on the preceding page shows the number and percent of students by portion of program completed at NMTC. The majority of respondents reported having been employed outside of the home. As can be seen in Figure 6 ninety-four and twenty-six hundreds percent of respondents indicated they had been employed outside of the home, and five and seventy-four hundreds percent reported they had not been employed outside of the home.

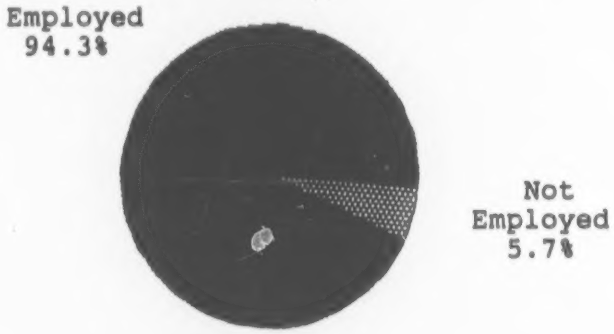

Figure 6

Work Status of Students

## Preferred Learning Techniques

On part two of the Student Questionnaire, the students were asked to respond to a thirty-two item techniques of learning inventory. Responses were given on a five point Likert scale ranging from "hinders learning," to "extremely helpful" for learning. Students' responses to how helpful they viewed the learning techniques is presented in Table 8 (p. 82) in rank order. The order is based on the means and standard deviations derived from students' preferred techniques.

Table 8

Rank Order of Students' Preferred Learning Techniques

| Rank | Technique | $\bar{X}$ (n=209) | SD |
|---|---|---|---|
| 1 | "On the job" training | 4.79 | .55 |
| 2 | Watching a demonstration | 4.64 | .65 |
| 3 | Performing a procedure in the lab or shop | 4.61 | .70 |
| 4 | Asking the teacher questions | 4.45 | .66 |
| 5 | Taking a "hands-on" test | 4.39 | .81 |
| 6 | Receiving personalized instruction from the teacher | 4.36 | .72 |
| 7 | Doing a workbook exercise | 4.30 | .71 |
| 8 | Being tutored in problem areas | 4.29 | .90 |
| 9 | Listening to the teacher lecture | 4.27 | .76 |
| 10 | Doing homework assignments | 4.22 | .73 |
| 11 | Reviewing topics in class | 4.21 | .77 |
| 12 | Going on a field trip | 4.17 | .94 |
| 13 | Reading the textbook | 4.16 | .84 |
| 14 | Working on a project in a group with classmates | 4.12 | 1.00 |
| 15 | Viewing slides, filmstrips, or videos | 4.07 | .79 |
| 16 | Listening to guest speakers | 4.07 | .80 |
| 17 | Participating in a discussion led by the teacher | 4.02 | .84 |
| 18 | Taking a written test | 4.00 | .79 |

## Table 8 (Cont.)

## Rank Order of Students' Preferred Learning Techniques

| Rank | Technique | $\overline{X}$ (n=209) | SD |
|---|---|---|---|
| 19 | Using the library | 3.98 | .96 |
| 20 | Role-playing real life situations | 3.94 | 1.03 |
| 21 | Writing answers to questions in the textbook | 3.91 | .89 |
| 22 | Taking notes while reading the textbook | 3.88 | .82 |
| 23 | Answering the teacher's questions | 3.88 | .97 |
| 24 | Working on a project alone (independent study) | 3.88 | 1.01 |
| 25 | Listening to an overhead and lecture presentation | 3.82 | .90 |
| 26 | Working with programmed instruction materials | 3.81 | .92 |
| 27 | Using the computer for learning purposes | 3.67 | 1.07 |
| 28 | Receiving instruction from other students | 3.56 | .97 |
| 29 | Participating in a group presentation or debate | 3.49 | 1.10 |
| 30 | Writing a research paper | 3.34 | 1.09 |
| 31 | Leading a class discussion | 3.12 | 1.11 |
| 32 | Giving a presentation in front of the class | 2.88 | 1.18 |

As a group, students viewed the following ten learning techniques, listed in priority order, as most helpful to their learning: "on the job" training, watching a demonstration, performing a procedure in the lab or shop, asking the teacher questions, taking a "hands-on" test, receiving personalized instruction from the teacher, doing a workbook exercise, being tutored in problem areas, listening to the teacher lecture, and doing homework assignments.

Beginning with the least preferred technique, students viewed the following ten learning techniques as least helpful to their learning: giving a presentation in front of the class, leading a class discussion, writing a research paper, participating in a group presentation or debate, receiving instruction from other students, using the computer for learning purposes, working with programmed instruction materials, listening to an overhead and lecture presentation, working on a project alone (independent study), and answering the teacher's questions.

## Evaluation by Gender

Gender differences do exist in the ways students preferred to learn. Table 9 (p. 85) presents the evaluation of students to learning techniques by gender. Significant gender differences existed in twelve of the thirty-two learning techniques.

Women had higher rankings than men on the techniques of taking a written test, listening to the teacher lecture, doing a workbook exercise, taking notes while reading the

Table 9

Evaluation of Students to Learning Techniques by Gender

| Technique | Female (n=110) $\bar{X}$ | Male (n=99) $\bar{X}$ | t |
|---|---|---|---|
| 1. Taking a written test | 4.18 | 3.81 | 3.45 |
| 2. Viewing slides, filmstrips, or videos | 4.09 | 4.04 | 0.45 |
| 3. Listening to the teacher lecture | 4.39 | 4.13 | 2.48 |
| 4. Watching a demonstration | 4.69 | 4.59 | 1.16 |
| 5. Doing homework assignments | 4.29 | 4.15 | 1.39 |
| 6. Reading a textbook | 4.21 | 4.10 | 0.92 |
| 7. Asking the teacher questions | 4.43 | 4.48 | -0.63 |
| 8. Doing a workbook exercise | 4.53 | 4.05 | 5.12 |
| 9. Working on a project in a group with classmates | 3.94 | 4.32 | -2.86 |
| 10. Performing a procedure in the lab or shop | 4.45 | 4.79 | -3.72 |
| 11. "On the job" training | 4.85 | 4.73 | 1.65 |
| 12. Writing answers to questions in the textbook | 3.93 | 3.90 | 0.23 |
| 13. Participating in a discussion led by the teacher | 3.97 | 4.08 | -0.93 |
| 14. Taking notes while reading the textbook | 4.05 | 3.69 | 2.63 |
| 15. Receiving personalized instruction from the teacher | 4.45 | 4.25 | 2.04 |
| 16. Giving a presentation | 2.79 | 2.98 | -1.15 |

### Table 9 (Cont.)

### Evaluation of Students to Learning Techniques by Gender

| Technique | Female (n=110) $\bar{X}$ | Male (n=99) $\bar{X}$ | t |
|---|---|---|---|
| 17. Participating in a group presentation or debate | 3.48 | 3.49 | -0.09 |
| 18. Working on a project alone | 3.80 | 3.96 | -1.19 |
| 19. Using the library | 3.98 | 3.97 | 0.09 |
| 20. Working with programmed instruction materials | 3.97 | 3.65 | 2.51 |
| 21. Answering questions | 3.75 | 4.01 | -2.29 |
| 22. Going on a field trip | 4.18 | 4.16 | 0.15 |
| 23. Taking a "hands-on" test | 4.22 | 4.59 | -3.39 |
| 24. Using the computer | 3.54 | 3.83 | -1.98 |
| 25. Listening to guest speakers | 4.16 | 3.97 | 1.75 |
| 26. Listening to an overhead and lecture presentation | 3.92 | 3.71 | 1.70 |
| 27. Receiving instruction from other students | 3.59 | 3.53 | 0.49 |
| 28. Being tutored | 4.25 | 4.33 | 0.71 |
| 29. Writing a research paper | 3.44 | 3.23 | 1.35 |
| 30. Leading a class discussion | 3.11 | 3.14 | -0.21 |
| 31. Reviewing topics in class | 4.35 | 4.05 | 2.79 |
| 32. Role-playing real life situations | 4.01 | 3.87 | 0.98 |

Underlined t values indicates significance at or beyond the .05 level textbook, receiving personalized instruction from the teacher, working with programmed instruction materials, and reviewing topics in class. Men tended to have higher rankings than women on the techniques of working on a project in a group with classmates, performing a procedure in the lab or shop, answering the teacher's questions, taking a "hands-on" test, and using a computer for learning purposes.

## Evaluation by Age

The sample was initially divided into three groups: students who were between seventeen and twenty-two years old; students who were between twenty-three years to fifty-five years old; and students over fifty-five years of age. Because there were no students over the age of fifty-five years in the resultant student sample, only two age categories were available for comparison. Table 10 (p. 88) shows the results of the two-sample t test used to evaluate differences by age in the preferred learning techniques of students.

There were significant age differences on twelve of the thirty-two techniques. The older students had higher ratings on the following eleven techniques: taking a written test, listening to the teacher lecture, doing homework assignments, reading the textbook, doing a workbook exercise, participating in a teacher led discussion, taking notes while reading the textbook, working with programmed instruction, listening to an overhead and lecture presentation, writing a research paper, and reviewing topics in class.

## Table 10

## Evaluation of Students to Learning Techniques by Age

| Technique | 17 - 22 (n=113) $\bar{X}$ | 23 - 55 (n=96) $\bar{X}$ | t |
|---|---|---|---|
| 1. Taking a written test | 3.88 | 4.16 | -2.59 |
| 2. Viewing audio-visuals | 4.03 | 4.11 | -0.80 |
| 3. Listening to the teacher lecture | 4.10 | 4.47 | -3.66 |
| 4. Watching a demonstration | 4.58 | 4.72 | -1.61 |
| 5. Doing homework assignments | 4.12 | 4.34 | -2.19 |
| 6. Reading a textbook | 4.02 | 4.32 | -2.69 |
| 7. Asking the teacher questions | 4.39 | 4.53 | -1.56 |
| 8. Doing a workbook exercise | 4.18 | 4.45 | -2.87 |
| 9. Working on a project in a group with classmates | 4.22 | 4.00 | 1.60 |
| 10. Performing a procedure in the lab or shop | 4.68 | 4.52 | 1.63 |
| 11. "On the job" training | 4.79 | 4.80 | -0.19 |
| 12. Writing answers to questions in the textbook | 3.86 | 3.98 | -0.99 |
| 13. Participating in a discussion led by the teacher | 3.90 | 4.17 | -2.33 |
| 14. Taking notes while reading the textbook | 3.75 | 4.03 | -2.00 |
| 15. Receiving personalized instruction from the teacher | 4.31 | 4.42 | -1.06 |
| 16. Giving a presentation in front of the class | 2.87 | 2.90 | -0.17 |

## Table 10 (Cont.)

## Evaluation of Students to Learning Techniques by Age

| Technique | 17 - 22 (n=113) $\bar{X}$ | 23 - 55 (n=96) $\bar{X}$ | *t* |
|---|---|---|---|
| 17. Participating in a group presentation or debate | 3.38 | 3.61 | -1.56 |
| 18. Working on a project alone | 3.77 | 4.00 | -1.74 |
| 19. Using the library | 3.87 | 4.10 | -1.79 |
| 20. Working with programmed instruction materials | 3.68 | 3.97 | -2.29 |
| 21. Answering questions | 3.86 | 3.90 | -0.33 |
| 22. Going on a field trip | 4.12 | 4.23 | -0.82 |
| 23. Taking a "hands-on" test | 4.51 | 4.25 | 2.32 |
| 24. Using the computer | 3.71 | 3.64 | 0.48 |
| 25. Listening to guest speakers | 3.98 | 4.18 | -1.80 |
| 26. Listening to an overhead and lecture presentation | 3.68 | 3.98 | -2.44 |
| 27. Receiving instruction from other students | 3.58 | 3.54 | 0.25 |
| 28. Being tutored | 4.29 | 4.28 | 0.09 |
| 29. Writing a research paper | 3.16 | 3.55 | -2.62 |
| 30. Leading a class discussion | 3.09 | 3.17 | -0.50 |
| 31. Reviewing topics in class | 4.11 | 4.32 | -2.09 |
| 32. Role-playing real life situations | 3.96 | 3.92 | 0.33 |

Underlined *t* values indicates significance at or beyond the .05 level

### Table 11

### Evaluation of Students to Learning Techniques by Marital Status

| | Technique | Single (n=129) | Divorced (n=18) | Married (n=62) | F |
|---|---|---|---|---|---|
| 1. | Taking a written test | 3.91 | 4.17 | 4.15 | 2.20 |
| 2. | Viewing slides, filmstrips, or videos | 4.01 | 4.28 | 4.13 | 1.19 |
| 3. | Listening to the teacher lecture | 4.15 | 4.22 | 4.53 | 5.71 |
| 4. | Watching a demonstration | 4.57 | 4.72 | 4.76 | 1.85 |
| 5. | Doing homework assignments | 4.16 | 4.44 | 4.31 | 1.81 |
| 6. | Reading a textbook | 4.00 | 4.39 | 4.42 | 6.22 |
| 7. | Asking the teacher questions | 4.39 | 4.56 | 4.56 | 1.72 |
| 8. | Doing a workbook exercise | 4.19 | 4.72 | 4.40 | 5.56 |
| 9. | Working on a project in a group with classmates | 4.21 | 4.22 | 3.90 | 2.09 |
| 10. | Performing a procedure in the lab or shop | 4.64 | 4.67 | 4.53 | 0.52 |
| 11. | "On the job" training | 4.80 | 4.78 | 4.79 | 0.01 |
| 12. | Writing answers to questions in the textbook | 3.86 | 4.11 | 3.97 | 0.79 |
| 13. | Participating in a discussion led by the teacher | 3.96 | 4.11 | 4.13 | 0.94 |
| 14. | Taking notes while reading the textbook | 3.71 | 4.06 | 4.19 | 5.36 |
| 15. | Receiving personalized instruction from the teacher | 4.31 | 4.50 | 4.42 | 0.86 |
| 16. | Giving a presentation in front of the class | 2.86 | 2.78 | 2.95 | 0.20 |

Table 11 (Cont.)

Evaluation of Students to Learning Techniques
by Marital Status

| Technique | Single (n=129) | Divorced (n=18) | Married (n=62) | F |
|---|---|---|---|---|
| 17. Participating in a group presentation or debate | 3.43 | 3.39 | 3.63 | 0.74 |
| 18. Working on a project alone | 3.80 | 4.17 | 3.95 | 1.42 |
| 19. Using the library | 3.90 | 4.28 | 4.05 | 1.49 |
| 20. Working with programmed instruction materials | 3.73 | 3.61 | 4.05 | 3.07 |
| 21. Answering the teacher's questions | 3.89 | 3.83 | 3.85 | 0.07 |
| 22. Going on a field trip | 4.09 | 4.33 | 4.29 | 1.21 |
| 23. Taking a "hands-on" test | 4.51 | 4.11 | 4.23 | 3.86 |
| 24. Using the computer | 3.75 | 3.67 | 3.52 | 1.01 |
| 25. Listening to guest speakers | 4.01 | 4.28 | 4.15 | 1.27 |
| 26. Listening to an overhead and lecture presentation | 3.68 | 4.00 | 4.05 | 3.96 |
| 27. Receiving instruction from other students | 3.62 | 3.56 | 3.44 | 0.76 |
| 28. Being tutored in problem areas | 4.33 | 4.61 | 4.10 | 2.76 |
| 29. Writing a research paper | 3.17 | 3.50 | 3.65 | 4.28 |
| 30. Leading a class discussion | 3.09 | 2.83 | 3.27 | 1.24 |
| 31. Reviewing topics in class | 4.11 | 4.28 | 4.39 | 2.91 |
| 32. Role-playing real life situations | 4.01 | 3.89 | 3.82 | 0.70 |

Underlined F-Ratio indicates significance at or beyond the .05 level

## Evaluation by Marital Status

Table 11 above shows the results of the one-way analysis of variance used to evaluate students' preferred learning techniques by marital status. The respondents were initially divided into four groups based on marital status: single, married, divorced, and widowed. Because none of the 209 students completing the questionnaire indicated widowed status, only three groups were used to compare students' preferred learning techniques by marital status.

There were significant differences between the means of single, divorced and married students on eight of the thirty-two learning techniques. Married students gave higher ratings to listening to the teacher lecture, reading the textbook, taking notes while reading the textbook, working with programmed instruction materials, listening to an overhead and lecture presentation, and writing a research paper. Divorced students gave higher ratings to doing a workbook exercise, whereas single students gave higher ratings to taking a "hands-on" test.

## Evaluation by Work Status

Students were asked whether they had ever been employed outside of the home. Table 12 (p. 93) shows the results of an evaluation of students to teaching/learning techniques by work status conducted using the one-way analysis of variance.

The only significant difference between the means of the two groups was on the technique of writing answers to questions in the textbook. The group of students who had

Table 12

Evaluation of Students to Learning Techniques
by Work Status

| | Technique | Employed (n=197) | Not Employed (n=12) | F |
|---|---|---|---|---|
| 1. | Taking a written test | 3.99 | 4.25 | 1.22 |
| 2. | Viewing slides, filmstrips, or videos | 4.07 | 4.08 | 0.01 |
| 3. | Listening to the teacher lecture | 4.27 | 4.17 | 0.23 |
| 4. | Watching a demonstration | 4.64 | 4.58 | 0.10 |
| 5. | Doing homework assignments | 4.21 | 4.42 | 0.89 |
| 6. | Reading a textbook | 4.15 | 4.33 | 0.55 |
| 7. | Asking the teacher questions | 4.46 | 4.42 | 0.04 |
| 8. | Doing a workbook exercise | 4.28 | 4.58 | 2.03 |
| 9. | Working on a project in a group with classmates | 4.12 | 4.17 | 0.03 |
| 10. | Performing a procedure in the lab or shop | 4.61 | 4.50 | 0.30 |
| 11. | "On the job" training | 4.80 | 4.75 | 0.08 |
| 12. | Writing answers to questions in the textbook | 3.88 | 4.50 | 5.66 |
| 13. | Participating in a discussion led by the teacher | 4.04 | 3.83 | 0.65 |
| 14. | Taking notes while reading the textbook | 3.87 | 4.08 | 0.51 |
| 15. | Receiving personalized instruction | 4.35 | 4.50 | 0.49 |
| 16. | Giving a presentation in front of the class | 2.91 | 2.42 | 1.96 |

## Table 12 (Cont.)

## Evaluation of Students to Learning Techniques by Work Status

| Technique | Employed (n=197) | Not Employed (n=12) | F |
|---|---|---|---|
| 17. Participating in a group presentation or debate | 3.50 | 3.33 | 0.25 |
| 18. Working on a project alone | 3.89 | 3.67 | 0.59 |
| 19. Using the library | 3.97 | 4.00 | 0.01 |
| 20. Working with programmed instruction materials | 3.81 | 3.83 | 0.01 |
| 21. Answering the teacher's questions | 3.88 | 3.83 | 0.03 |
| 22. Going on a field trip | 4.16 | 4.42 | 0.86 |
| 23. Taking a "hands-on" test | 4.40 | 4.33 | 0.07 |
| 24. Using the computer | 3.67 | 3.75 | 0.06 |
| 25. Listening to guest speakers | 4.06 | 4.33 | 1.36 |
| 26. Listening to an overhead and lecture presentation | 3.82 | 3.83 | 0.00 |
| 27. Receiving instruction from other students | 3.56 | 3.50 | 0.05 |
| 28. Being tutored in problem areas | 4.27 | 4.50 | 0.71 |
| 29. Writing a research paper | 3.35 | 3.25 | 0.09 |
| 30. Leading a class discussion | 3.14 | 2.83 | 0.87 |
| 31. Reviewing topics in class | 4.19 | 4.50 | 1.89 |
| 32. Role-playing real life situations | 3.94 | 4.00 | 0.04 |

Underlined F-Ratio indicates significance at or beyond the .05 level never been employed outside of the home gave higher ratings to this learning technique. There were no significant differences in the means of the two groups on the other thirty-one learning techniques. It should be noted that only twelve students, out of the 209 respondents, indicated they had never been employed outside of the home.

### Evaluation by Portion of Program Completed

Table 13 (p. 96) shows the results of an evaluation of students to learning techniques by the portion of their program completed, using the one-way analysis of variance. Respondents were divided into four groups based upon their responses on the questionnaire to the question asking for the portion of program they had completed. The four groups consisted of students who had completed the following segments of their program: less than one-quarter of their program; between one-quarter and one-half of their program; between one-half and three-quarters of their program; and over three-quarters of their program.

Twelve of the thirty-two comparisons were significantly different. There was a slight tendency for students completing less than one-quarter of their program to prefer taking a written test. The longer the students had been in school, the least likely they were to give high ratings to taking a written test.

Reading the textbook was preferred by students completing less than one-quarter of their program, whereas it was least preferred by the group having been in school the longest.

## Table 13

### Evaluation of Students to Learning Techniques by Portion of Program Completed

| | Technique | <1/4 (n=21) | 1/4-1/2 (n=41) | 1/2-3/4 (n=89) | >3/4 (n=58) | F |
|---|---|---|---|---|---|---|
| 1. | Taking a written test | 4.14 | 4.12 | 4.11 | 3.71 | 3.94 |
| 2. | Viewing slides, filmstrips or videos | 3.71 | 3.98 | 4.17 | 4.10 | 2.12 |
| 3. | Listening to the teacher lecture | 4.05 | 4.20 | 4.42 | 4.17 | 2.20 |
| 4. | Watching a demonstration | 4.43 | 4.56 | 4.76 | 4.59 | 2.19 |
| 5. | Doing homework assignments | 4.48 | 4.29 | 4.17 | 4.17 | 1.23 |
| 6. | Reading a textbook | 4.52 | 4.07 | 4.27 | 3.91 | 3.74 |
| 7. | Asking the teacher questions | 4.62 | 4.37 | 4.43 | 4.50 | 0.81 |
| 8. | Doing a workbook exercise | 4.29 | 4.24 | 4.47 | 4.09 | 3.75 |
| 9. | Working on a group project with classmates | 4.24 | 4.05 | 3.93 | 4.41 | 2.96 |
| 10. | Performing a procedure in lab/shop | 4.43 | 4.46 | 4.65 | 4.71 | 1.56 |
| 11. | "On the job" training | 4.52 | 4.78 | 4.90 | 4.74 | 3.08 |
| 12. | Writing answers to questions in the textbook | 4.00 | 3.95 | 3.88 | 3.91 | 0.14 |
| 13. | Participating in a discussion led by teacher | 4.05 | 4.02 | 4.03 | 4.00 | 0.02 |
| 14. | Taking notes while reading textbook | 4.14 | 4.02 | 3.98 | 3.53 | 3.38 |
| 15. | Receiving personalized instruction from teacher | 4.43 | 4.24 | 4.43 | 4.31 | 0.76 |

Table 13 (Cont.)

Evaluation of Students to Learning Techniques
by Portion of Program Completed

| Technique | <1/4 (n=21) | 1/4-1/2 (n=41) | 1/2-3/4 (n=89) | >3/4 (n=58) | F |
|---|---|---|---|---|---|
| 16. Giving a presentation in front of the class | 2.38 | 2.63 | 2.97 | 3.10 | 2.74 |
| 17. Participating in a group presentation or debate | 3.29 | 3.17 | 3.56 | 3.67 | 2.10 |
| 18. Working on a project alone | 3.86 | 4.15 | 3.81 | 3.79 | 1.36 |
| 19. Using the library | 4.24 | 4.15 | 3.96 | 3.79 | 1.69 |
| 20. Working with programmed instruction materials | 3.76 | 3.78 | 3.96 | 3.64 | 1.46 |
| 21. Answering the teacher's questions | 3.90 | 4.02 | 3.82 | 3.84 | 0.61 |
| 22. Going on a field trip | 3.43 | 4.24 | 4.26 | 4.26 | 5.17 |
| 23. Taking a "hands-on" test | 4.14 | 4.51 | 4.30 | 4.53 | 1.92 |
| 24. Using the computer | 3.81 | 4.02 | 3.34 | 3.90 | 5.68 |
| 25. Listening to guest speakers | 3.71 | 4.00 | 4.25 | 3.98 | 3.26 |
| 26. Listening to an overhead and lecture presentation | 3.62 | 3.88 | 3.96 | 3.64 | 1.88 |
| 27. Receiving instruction from other students | 3.43 | 3.56 | 3.55 | 3.62 | 0.20 |
| 28. Being tutored in problem areas | 4.52 | 4.49 | 4.10 | 4.34 | 2.56 |
| 29. Writing a research paper | 3.43 | 3.39 | 3.45 | 3.10 | 1.28 |
| 30. Leading a class discussion | 2.90 | 3.12 | 3.20 | 3.09 | 0.44 |

Table 13 (Cont.)

Evaluation of Students to Learning Techniques
by Portion of Program Completed

| Technique | <1/4 (n=21) | 1/4-1/2 (n=41) | 1/2-3/4 (n=89) | >3/4 (n=58) | F |
|---|---|---|---|---|---|
| 31. Reviewing topics in class | 4.33 | 4.10 | 4.29 | 4.10 | 1.19 |
| 32. Role-playing real life situations | 3.48 | 3.59 | 4.18 | 4.00 | 4.97 |

Underlined F-Ratio indicates significance at or beyond the .05 level

The group completing between one-half and three-quarters of their program favored doing a workbook exercise more than the other groups, whereas the group nearing program completion favored working on a project in a group with classmates.

The group of students completing between one-half and three-quarters of their program favored "on the job" training the most. The newest students scored the lowest mean on this technique; however, all groups assigned high ratings to this technique.

The students completing less than one-quarter of their program preferred taking notes while reading the textbook. This technique became increasingly less popular the longer students remained in school. Students having been in school the longest were more amenable to giving a presentation in front of the class. This technique gained popularity the longer students remained in school.

Going on a field trip was favored most by students having been in school the longest. The longer students remained in school, the more favorable they became to this technique. The means of the two groups completing the largest segment of their programs had identical means. When the mean values are carried out to the fourth decimal place, it is found that the variance of the group remaining in school the longest is slightly greater (0.15) than the group completing between one-half and three-quarters of their program.

The group of students completing between one-quarter and one-half of their program tended to favor using the computer for learning purposes, whereas the group completing between one-half and three-quarters of their program tended to favor listening to guest speakers and being tutored in problem areas. This same group showed a preference slightly over the other groups for role-playing real life situations.

### Evaluation by Grade Point Average

Students indicated on the questionnaire whether their grade point average was below 2.0, 2.0 - 2.9, or 3.0 or above. Table 14 (p. 100) presents the results of an evaluation of students to learning techniques by the three categories of grade point average, using the one-way analysis of variance. Eight of the thirty-two techniques showed significant differences in students' learning preferences based on grade point average. Of the three groups, students with a grade point average between 2.0 and 2.9 gave the

Table 14

Evaluation of Students to Learning Techniques
by Grade Point Average

| | Technique | < 2.0 (n=8) | 2.0 - 2.9 (n=105) | ≥ 3.0 (n=96) | F |
|---|---|---|---|---|---|
| 1. | Taking a written test | 3.50 | 3.94 | 4.11 | 2.91 |
| 2. | Viewing audio-visuals | 3.50 | 4.08 | 4.10 | 2.18 |
| 3. | Listening to the teacher lecture | 3.88 | 4.20 | 4.38 | 2.50 |
| 4. | Watching a demonstration | 4.38 | 4.59 | 4.72 | 1.68 |
| 5. | Doing homework assignments | 4.00 | 4.25 | 4.22 | 0.43 |
| 6. | Reading a textbook | 4.13 | 4.15 | 4.17 | 0.01 |
| 7. | Asking the teacher questions | 4.00 | 4.39 | 4.56 | 3.72 |
| 8. | Doing a workbook exercise | 4.13 | 4.28 | 4.34 | 0.49 |
| 9. | Working on a project in a group with classmates | 4.13 | 4.31 | 3.91 | 4.31 |
| 10. | Performing a procedure in the lab or shop | 4.63 | 4.51 | 4.71 | 1.95 |
| 11. | "On the job" training | 4.63 | 4.73 | 4.88 | 2.11 |
| 12. | Writing answers to questions in the textbook | 4.13 | 3.97 | 3.83 | 0.84 |
| 13. | Participating in a discussion led by teacher | 3.63 | 4.00 | 4.08 | 1.19 |
| 14. | Taking notes while reading the textbook | 3.38 | 3.94 | 3.85 | 1.23 |
| 15. | Receiving personalized instruction from teacher | 4.13 | 4.37 | 4.36 | 0.44 |
| 16. | Giving a presentation in front of the class | 2.25 | 2.89 | 2.93 | 1.21 |

Table 14 (Cont.)

Evaluation of Students to Learning Techniques by Grade Point Average

| Technique | < 2.0 (n=8) | 2.0 - 2.9 (n=105) | ≥ 3.0 (n=96) | F |
|---|---|---|---|---|
| 17. Participating in a group presentation or debate | 2.75 | 3.58 | 3.45 | 2.28 |
| 18. Working on a project alone | 3.50 | 3.61 | 4.20 | 10.83 |
| 19. Using the library | 4.13 | 3.96 | 3.98 | 0.11 |
| 20. Working with programmed instruction materials | 3.50 | 3.81 | 3.84 | 0.52 |
| 21. Answering questions | 3.88 | 3.83 | 3.93 | 0.36 |
| 22. Going on a field trip | 3.25 | 4.18 | 4.24 | 4.23 |
| 23. Taking a "hands-on" test | 4.50 | 4.35 | 4.43 | 0.28 |
| 24. Using the computer | 3.00 | 3.86 | 3.53 | 4.07 |
| 25. Listening to guest speakers | 4.13 | 4.02 | 4.13 | 0.45 |
| 26. Listening to an overhead and lecture presentation | 3.75 | 3.70 | 3.95 | 1.86 |
| 27. Receiving instruction from other students | 3.25 | 3.68 | 3.46 | 1.70 |
| 28. Being tutored | 4.13 | 4.43 | 4.15 | 2.65 |
| 29. Writing a research paper | 2.25 | 3.30 | 3.48 | 5.02 |
| 30. Leading a class discussion | 2.38 | 3.10 | 3.22 | 2.23 |
| 31. Reviewing topics in class | 3.38 | 4.28 | 4.20 | 5.37 |
| 32. Role-playing real life situations | 3.00 | 4.00 | 3.96 | 3.60 |

Underlined F-Ratio indicates significance at or beyond .05

highest ratings on working on a project in a group with classmates, using the computer for learning purposes, reviewing topics in class, and role-playing real life situations.

There was a significance at the .0001 level on the technique of working on a project alone (independent study). The higher the students' grade point average, the more students perceived this technique to be helpful to their learning. There were significant differences in how helpful students viewed the techniques of asking the teacher questions, going on a field trip, and writing research papers. Again, the higher the students' grade point average, the more students perceived these ways of learning as helpful.

## Evaluation by Locus of Control

Students' responses to the Internal/External Control Scale were categorized into one of three groups: internal, middle, and external. Scores between one and six fell into the lower quartile (<25%); scores between seven and seventeen fell into the middle quartile (≤ 25% ≤ 75%); and scores between eighteen and twenty-three fell into the upper quartile (>75%). Students scoring in the lower quartile were considered to have an "internal" locus of control. Students scoring in the middle quartile were considered to have a "middle" or medium locus of control. Lastly, students scoring in the upper quartile were considered to have an "external" locus of control.

Seventy-three students completed the locus of control instrument. Twelve students had an internal locus of control; fifty-seven students scored in the middle; and four students had an external locus of control. Students preferred learning techniques were compared by the three groups, using the one-way analysis of variance.

There were only four techniques on which the preferences of the three groups differed significantly. Internals favored taking a written test, listening to the teacher lecture, and listening to an overhead and lecture presentation. Both the internal and middle groups found programmed instruction more helpful than did the external group.

## Evaluation by Learning Style

An evaluation of students to learning techniques by the four learning styles on Kolb's Learning Style Inventory (LSI) was conducted, using the one-way analysis of variance. Students' scores were determined and assigned to four groups according to the type of learning style: diverger, accommodator, converger, and assimilator.

Students' scores showed that thirteen students were divergers, twenty students were accommodators, twelve students were convergers, and twenty-one students were assimilators. There were six techniques on which there were significant differences between learning styles.

Accommodators found viewing slides, filmstrips, or videos more helpful than did the other groups. Assimilators were the group least likely to find this technique helpful. Working on a project in a group with classmates was perceived as very helpful to divergers. Again, assimilators were the group least likely to view this technique helpful.

Although all groups rated the technique high, both accommodators and convergers tended to view "on the job" training as the most helpful for their learning. Assimilators were more favorable to working on a project alone (independent study), whereas accommodators, followed by divergers, were more favorable to being tutored in problem areas. Accommodators also preferred role-playing real life situations more than did the other groups.

## Evaluation by Ways of Coping

The Ways of Coping Questionnaire consisted of eight subscales and generated a score for each of the subscales. The highest score, of the eight scores, generated by each respondent was considered. The highest score was indicative of the coping process used most frequently. In essence, there were eight separate variables but only one of the eight variables was relevant to each respondent. Seventy students completed the coping instrument.

The students' scores were divided into eight groups based on the most frequently used coping process. A one-way analysis of variance was computed in order to evaluate students to learning techniques by the eight groups of coping processes. The eight coping processes are as follows: confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal.

Students did not differ in their preference for learning techniques based on the processes they used to cope with stress. Those students using escape as their predominant coping process tended to prefer being tutored in problem areas more than did the other groups; however, the probability between groups (.049) was barely significantly different than chance.

## Other Helpful Learning Techniques

Students were provided with space on the questionnaire to list helpful learning techniques other than the thirty-two which were listed. Students' actual responses were summarized and presented in the appendices of this report. Responses were listed in no particular order. If a response was listed by more than one student, that response was listed only once in order to minimize space and to prevent redundancy.

Thirty-two different comments were made by respondents. Some examples of the comments are as follows: study-guides with textbooks, correcting homework in class, using examples from everyday life, and playing role games. Many of the students' responses were reiterations of several of the techniques listed in the questionnaire. Other comments related to the learning environment, for example, "a relaxed atmosphere in the classroom." Three comments referred to situations that did not contribute to learning.

## Table 15

## Rank Order Comparison of Most Helpful Learning Techniques by Students' Major Area of Study

| Rank | Nursing (n=75) | Business Tech. (n=39) | Trade & Tech. (n=95) |
|---|---|---|---|
| 1 | "on the job" training | "on the job" training | "on the job" training |
| 2 | watching a demo | being tutored in problem areas | performing a procedure in the lab or shop |
| 3 | listening to the teacher lecture | listening to the teacher lecture | taking a "hands-on" test |
| 4 | performing a procedure in the lab or shop | watching a demo | working on a project in a group with classmates |
| 5 | taking a "hands-on" test | doing homework assignments | being tutored in problem areas |
| 6 | taking notes while reading the textbook | receiving personalized instruction from the teacher | watching a demo |
| 7 | listening to an overhead and lecture presentation | asking the teacher questions | asking the teacher questions |
| 8 | reading the textbook | doing a workbook exercise | receiving personalized instruction from the teacher |
| 9 | doing homework assignments | taking notes while reading the text | reviewing topics in class |
| 10 | reviewing topics in class | working on a project in a group with classmates | doing homework assignments |

## Most Helpful Learning Techniques

Students were asked on the questionnaire which two learning techniques were the best for helping them to learn. The students' selections were analyzed and tallied. As can be seen in Table 15 above (p. 106), the ten learning techniques identified by students were rank ordered for each of the three academic departments: nursing, business technology, and trade and technical.

Students from all three academic areas agreed on the helpfulness of one learning technique: that of "on the job" training. All three groups ranked "on the job" training as the number one learning technique deemed best for helping them to learn. Watching a demonstration and doing homework assignments were also preferred learning techniques common to all groups.

Listening to the teacher lecture ranks third on the list of top ten preferred learning techniques of the nursing and business students, but was not indicated as a favored way of learning by the trade and technical students. Performing a procedure in the lab or shop, taking a "hands-on" test, and reviewing topics in class are included in the list of favored ways of learning by the nursing and trade and technical students but are not included by the business students. Business students included doing a workbook exercise on their list of preferred techniques; however, the other two groups did not include this technique.

Taking notes while reading the textbook is included on the list of favored ways of learning by the nursing and business students but does not appear to be a favored way of learning by the trade and technical students. The nursing students indicated that listening to an overhead and lecture presentation and reading the textbook were helpful to their learning, whereas both the trade and technical and business students indicated that being tutored in problem areas, receiving personalized instruction from the teacher, asking the teacher questions, and working on a project in a group with classmates were most helpful to their learning.

## Common Teaching/Learning Techniques

The surveys completed by faculty and students contained twenty-three teaching/learning techniques in common. Table 16 (p. 109) shows a comparison of a rank listing of the twenty-three common techniques by both faculty and students, determined by comparing the computed means for each of the twenty-three common techniques for both groups. It should be noted that the student questionnaire contained thirty-two techniques, and the faculty questionnaire contained twenty-three techniques. The teaching/learning techniques are listed in the table in order from the most helpful learning technique to the least helpful, according to the perceptions of faculty. The means for each technique are in parenthesis to the right of the number rank. The techniques not shared in common by faculty and students were deleted from the

### Table 16

### Comparison of the Ranking of the Common Teaching/Learning Techniques by Faculty and Students

| Common Technique | Faculty Rank | ($\overline{X}$) | Student Rank | ($\overline{X}$) |
|---|---|---|---|---|
| Lecture | 1 | (2.86) | 6 | (4.28) |
| Written Exams | 2 | (2.72) | 13 | (4.00) |
| Questioning Students | 3 | (2.69) | 15 | (3.88) |
| Homework | 4 | (2.58) | 7 | (4.22) |
| Demonstration | 5 | (2.53) | 2 | (4.64) |
| Discussion, Teacher Led | 6 | (2.44) | 12 | (4.02) |
| Review Sessions | 7 | (2.22) | 8 | (4.21) |
| Practical Exams | 8 | (2.17) | 4 | (4.39) |
| Laboratory/Shop | 9 | (2.14) | 3 | (4.61) |
| Slides/Filmstrips/Videos | 10 | (1.89) | 11 | (4.07) |
| Individualized Instruction | 11 | (1.69) | 5 | (4.36) |
| Peer Teaching | 12 | (1.50) | 19 | (3.56) |
| "On the Job" Training | 13 | (1.50) | 1 | (4.79) |
| Discussion, Student Led | 14 | (1.44) | 22 | (3.12) |
| Small Group Study | 15 | (1.39) | 10 | (4.12) |
| Computer Instruction | 16 | (1.25) | 18 | (3.67) |
| Research Papers | 17 | (1.22) | 21 | (3.34) |
| Field Trips | 18 | (1.17) | 9 | (4.17) |
| Programmed Instruction | 19 | (1.17) | 17 | (3.81) |
| Student Presentation | 20 | (1.06) | 23 | (2.89) |

Table 16 (Cont.)

Comparison of the Ranking of the Common Teaching/Learning Techniques by Faculty and Students

| Common Technique | Faculty Rank | ($\bar{X}$) | Student Rank | ($\bar{X}$) |
|---|---|---|---|---|
| Independent Study | 21 | (1.00) | 16 | (3.88) |
| Role-Play | 22 | (0.83) | 14 | (3.94) |
| Panel Presentation/ debate | 23 | (0.47) | 20 | (3.49) |

from the students' rank order listing, and the numbers were adjusted accordingly.

There was some discrepancy between students and faculty in the way they viewed the helpfulness of the various teaching/learning techniques. The two groups were in agreement on the helpfulness of the following techniques: review sessions, slides/filmstrips/videos, computer aided instruction, programmed instruction, panel presentation/ debate, student presentation, demonstration, and homework. The two groups assigned ratings to these techniques varying between one and three ranks, for example, review sessions ranked seventh on the faculty's list of preferred teaching techniques and ranked eighth on the students' list of preferred learning techniques.

The techniques showing the most disagreement between groups were as follows: written exams, questioning students, "on the job" training, student led discussions, field trips, "on the job" training, student led discussions, field trips, and role-play. There was moderate disagreement on the helpfulness of the lecture, teacher led discussion, laboratory/shop, individualized instruction, peer teaching, small group study, independent study, library or research papers, and independent study. A discussion of the study findings is presented in the next chapter, followed by conclusions, implications and recommendations.

## Chapter 5

## DISCUSSION, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

### Teaching Techniques

The lecture method of instruction was the most frequently used technique and faculty perceived this method to be the most helpful to students' learning. Teacher led discussion, review sessions, demonstration, and the use of slides/filmstrips/videos ranked next as methods for imparting information to students.

Evaluation methods such as written exams, questioning students, homework, and practical exams ranked high on faculty's list of effective teaching/learning techniques. Additionally, use of the laboratory/shop was perceived as beneficial to students' learning. These ten techniques, viewed by faculty to be the most helpful to students' learning, are considered "traditional," "time-honored," passive, high-structure, or teacher-centered techniques.

The techniques to which faculty assigned the lowest ratings, for example, panel/presentation/debate, role-play, independent study, student presentation, field trips, are considered to be "nontraditional," active, low-structure, or student-centered teaching techniques. It should be noted that the technique, panel presentation/debate was rated as the least favored technique. It is possible that these two techniques may have invoked a negative response for some reason. Perhaps if they had been separated, faculty would have responded more favorably to one, or both techniques.

Drummond and Sutton (1978) also found that vocational technical institute faculty preferred these same teaching techniques. The techniques were not ranked in the same manner as they were in this study; however, nine of the ten techniques appear in both studies. Drummond and Sutton did not include the technique of questioning students on their teacher questionnaire. If they had, this technique may have been included on the list of faculty's top ten preferred teaching techniques.

Breckon (1988:1) contends that "most adult educators have not been taught how to teach adults and revert to teaching the way they were taught." It would appear that the NMTC faculty make use of teacher-centered methods more often than student-centered methods. Students are thought to learn passively; active teaching techniques are not believed to be as effective for students' learning.

Freeland and Franklin (1989) investigated the degree to which health education professors adhere to, and practice, the principles of adult education. They found that a gap exists in professors' knowledge base in relation to the adult as a learner and adult education principles. Significant differences were also found among health professors in regard to espoused philosophy; some regarded adult students as passive recipients of prescribed information, contrary to the collaborative mode and adult education in general. Finally, the study suggests that training is needed to move health education professors from lecturing and other limited instructional modes into a more student-centered involvement with students.

## Holland's Personality Types

None of the results from the evaluation of teaching techniques by Holland's personality types was surprising. For example, the realists preferred techniques that involved individualized instruction and laboratory/shop. The investigative types also favored the laboratory/shop, and the enterprising types did not care for the written exam. These preferences are consistent with Holland's description of the occupational personality types.

There were significant differences in the way that the various personality types viewed seven of the twenty-three teaching techniques. It was interesting that there were not more differences of opinion by personality type.

## Years of Teaching Experience

The faculty sample was divided at the upper and lower quartiles to see if differences existed in instructional methods used by years of teaching experience. There were no significant differences in the preferred instructional techniques of NMTC's faculty respondents based on years of teaching experience. Drummond and Sutton (1978) found that beginning level teachers with zero to three years of experience preferred programmed instruction, and teachers with four to thirteen years of experience made more use of field trips as an instructional method.

Sprinthall and Thies-Sprinthall (1980), cognitive developmental theorists, suggest that teachers' cognitive developmental levels predict teaching styles more than do years of teaching experience. These theorists and many others, believe that the amount of structure that teachers apply to the learning environment (teacher-centered vs student-centered) has a direct relationship to teachers' cognitive developmental levels. "Developmentally complex teachers make such decisions based on the pupils' needs and current functioning ..." (20).

It is possible that if faculty had been classified according to cognitive developmental level rather than years of teaching experience, significant differences in their preferred teaching techniques. It is also possible that the sample size (n=36) was too small to allow different perceptions to manifest themselves. However, it is equally possible that NMTC's inexperienced faculty model the teaching behaviors of their more experienced peers in an effort to "fit in" and conform to general faculty expectations. It is feasible that certain types of faculty are attracted to the technical college or that the technical college limits instructional diversity, although this does not appear to be the case at NMTC. NMTC's faculty appear to have ample latitude to use a variety of instructional methods.

## Academic Department

In order to compare teaching preferences by program category, the faculty sample was grouped into the general categories of nursing, business technology, trade and technical, and general education. The majority of faculty from each of the latter three departments completed questionnaires.

Six nursing faculty elected not to complete the faculty survey, and one nursing faculty member was off campus when the surveys were administered. This meant that the resultant faculty sample contained less than half of NMTC's nursing faculty. It also meant that men would make up the majority of the respondent group as the seven nursing faculty not participating in the study were female. The impact of this situation on the findings of the study is not known. It can be speculated that the findings resulting from the evaluation of teaching techniques by academic department may have differed somewhat if the entire nursing faculty had contributed to the study.

There were significant differences in the views the four groups held about six of the instructional techniques. Nursing instructors viewed audiovisuals more helpful to students' learning than did the other groups. As might be expected, the nursing faculty makes use of this technique extensively. This difference was significant at <.0001. The trade and technical instructors, unlike the other three groups, viewed programmed instruction as very beneficial.

The general education instructors unlike the other three groups, followed closely by the business technology instructors, did not view field trips as especially helpful to students. This technique is not commonly used by these groups of faculty. Surprisingly, the trade and technical faculty viewed individualized instruction in a better light than did the other faculty groups. It might be assumed that vocational instructors would teach groups of students in much the same manner, and technical instructors would tend to make more use of individualized instruction. This scenario does not play itself out at NMTC. It is possible that the "perceived" value of individualized instruction differs from the "actual" use of individualized instruction.

The trade and technical instructors and the business instructors reported practical examinations to be valuable learning experiences. This is not surprising because these two groups of instructors commonly use practical examinations to evaluate students. Nursing faculty are bound by National League for Nursing guidelines calling for objective (multiple-choice) testing of nursing students in the classroom.

Nursing instructors and trade and technical instructors, as expected, believed laboratory/shop to be helpful to students' learning. Both groups of faculty make extensive use of the laboratory/shop as student learning experiences. The general education instructors have no laboratory/shops, per se, which may have something to do with the fact that this group assigned very low ratings to this instructional technique.

## Successful Teaching Techniques

Faculty identified traditional teaching techniques as the most successful for helping students to learn. The following techniques were identified: lecture, laboratory/shop, demonstration, teacher led discussion, "on the job' training, practical exams, homework, questioning students, written exams, and slides/filmstrips/videos. These are the learning experiences that vocational-technical schools typically use. Inconsistent with the findings of this study, Drummond and Sutton (1978) found that peer teaching, student led discussion, and research papers ranked in faculty's (n=167) top ten successful teaching techniques.

It is possible that educators report the use of a variety of successful teaching methods, while continuing to use predominantly one or two techniques. For example, a teacher may claim that computer aided instruction is very successful for helping students to learn, but s/he does not make use of this particular technique often, if ever.

One case in point is a study conducted by Martin and Omer (1990) to identify methods of delivering agriculturally related educational programs to adults in Iowa. These investigators found that postsecondary educators (n=42) tended to indicate a higher level of regard for principles of teaching and learning than did extension professionals (n=38). Although respondents placed high priority on use of a variety of instructional methods, they tended to use one method - lecture/discussion.

## Learning Techniques

Students' rated "on the job" training as the most helpful learning technique, regardless of major program of study. It is interesting to note that in Drummond and Sutton's (1978) study of vocational-technical institute students, it was found that students rated work experience as their most valuable way of learning. This same study found that the learning technique of giving reports was students' least favored way of learning. Consistent with these findings, the findings of his study indicated that students' least favored learning technique was giving a presentation in front of the class.

The second technique in order of perceived helpfulness to students was watching a demonstration. Third in order was performing a procedure in the laboratory or shop. Fourth in order of helpfulness was practical examinations. The preferred learning methods are all methods that one would expect to find frequently utilized by post-secondary instructors in a vocational-technical school.

Students' may have perceived certain learning techniques more amicably to their learning if these techniques were readily available to them at NMTC. For example, students may have been neutral or undecided on techniques involving computers, role-play, peer teaching, independent study, and programmed instruction because they are not readily available to all students.

Students did not like student-led discussion, research papers, or panel presentation/debate, though they disliked student presentations more. Perhaps the technique of panel presentation/debate should have been separated into two distinct techniques. One or the other technique could have invoked strong or contradictory feelings in some students, thereby distorting the responses.

It is possible that students would have assigned high ratings to techniques not provided on the questionnaire. Techniques such as correcting homework in class, taking notes during the lecture, and simulation games were identified by students as other learning techniques helpful to their learning.

Generally speaking, students preferred practical and traditional ways of learning, such as the lecture and the demonstration. Overall, the students responses to the various teaching/learning techniques were positive.

Linardes (1989) found that learning style preference of traditional and nontraditional students did not differ. All students in her study indicated "a strong desire for concrete learning and a teacher-structured instructional situation" 358.

## Age

Thorndike performed the pioneer research on adult learning ability. In 1928 Thorndike concluded that the curve of ability to learn increases to age twenty, stays at a plateau until age forty, and then tapers off thirteen to fifteen percent in later years (Rathus, 1987). Current researchers extend it into later years because today people live longer and healthier lives (Kidd, 1973).

In this study, both the younger students and the older students rated "on the job" training as the learning technique most helpful to them. This finding is inconsistent with that found in the educational literature. The literature indicates that adult students should rate practical learning experiences higher than would the traditional students (for example, Knowles, 1980; Bents and Howey, 1981).

The older students differed from the younger students significantly more than chance in their preference for traditional (time-honored) learning techniques, such as the lecture, taking a written test, doing homework, reading the textbook, and doing a workbook exercise. The younger students gave higher ratings to taking a "hands-on" test.

The finding that older students preferred learning techniques that are considered more passive and traditional is inconsistent with the principles of adult learning and the findings of many studies on adult learning. For example, Hughes (1983) did an extensive synthesis of the literature on the nontraditional student in higher education and concluded that nontraditional students prefer informal learning and traditional students prefer formal learning. In fact, Hughes cites studies finding that nontraditional students prefer a teaching approach other than the lecture, and studies finding that traditional students prefer the lecture.

Imel (1982:3) conducted an information analysis on how adults learn and concludes:

> Is teaching adults different? Based on the literature discussed here, the answer is both yes and no. Although teachers perceive adults as being different, these perceptions do not automatically translate into differences in approaches to teaching.

"Although the andragogical approach to teaching adults has been widely espoused by adult educators, until recently there has been no effort to test whether teachers do actually use a different style when teaching adults" (Imel, 1989:2). Two studies (Beder and Darkenwald, 1982; Gorham 1985) sought to determine whether teachers use different instructional techniques with adults and preadults (adolescents).

Beder and Darkenwald used a self-report questionnaire, and Gorham used a revised version of Beder and Darkenwald's questionnaire, followed by classroom observations to collect her data. The teachers surveyed in both of these studies perceived major differences in the teaching styles used with adults and pre-adults. With adults they structured the learning activities less tightly and varied their instructional techniques more. Beder and Darkenwald found that teachers teaching adults used more group discussion and a greater relationship of class material to student life experiences than they did when teaching pre-adults. It is interesting to note that Gorham's (1985) phase two classroom observations did not substantiate the self-reported differences in teaching behavior.

A study conducted to determine the learning styles of adult learners found that adults favored mode of learning was through the lecture and discussion approach (Check, 1984). In contrast, Linardes (1989) found that the age of nursing students did influence students' self-directed learning readiness: "older students indicated a greater readiness to be self-directed in their learning than younger students" (358).

It is possible that the students in this study differed significantly from their age counterparts in the university setting. Perhaps adult vocational-technical students prefer traditional approaches to learning more than do non-traditional university students.

## Gender

The women in the sample preferred techniques often characterized as passive, for example, listening to the teacher and working alone. The men in the sample preferred techniques characterized in the literature as active learning techniques, involving "doing," rather than listening. Additionally, the men favored group interaction as opposed to individual ways of learning.

It is feasible that the male students, more than female students, held jobs that involved "hands-on" work and teamwork. This could contribute, in part, to the differences in preferred learning methods by male and female students.

## Marital Status

There were significant differences in the favored learning methods by married, single, and divorced students. Married students gave higher ratings to the passive ways of learning, including, but not limited to, listening to the teacher lecture, reading the textbook, taking notes while reading the textbook, and listening to an overhead and lecture presentation. Divorced students rated doing a workbook exercise higher than did the other two groups, and single students gave the highest group responses to taking a "hands-on" test.

Doing a workbook exercise, like the techniques preferred by the married students, is a passive means for learning. Taking a "hands-on" test is a learning method considered to be an active learning experience. In general, the married students, or those who had been married, favored passive learning, whereas the single students tended to favor active learning. Overall, married students gave higher ratings than did single students to all ways of learning.

## Work Status

Basically, there were no differences in the way students preferred to learn by work status. The exception to this situation is on the technique of writing answers to questions in the textbook. Students with no work experience outside of the home gave higher ratings to this technique. It should be noted that only twelve students, out of a sample of 209 students, indicated they had never been employed outside of the home. This fact could have affected the findings thus limiting the value of the findings.

If the sample had been compared on more specific areas of work status, such as working part-time, full-time, currently unemployed, differences in favored ways of learning may have surfaced. It is possible that students working full-time would have been more positive about learning activities than those students who had lost their jobs. Students' work status may have influenced how they thought, and felt, about their programs of study, thus influencing their responses on the questionnaire. For example, nursing students having been employed as nurses' aides may have been more confident doing a procedure in the lab, or taking a "hands-on" test, than would students having never been employed as nurses' aides.

### Portion of Program Completed

There were significant differences in the ways students preferred to learn according to the portion of program completed. There was a tendency for students who had completed less than one-quarter of their program to prefer taking a written test, reading the textbook, and taking notes while reading the textbook. The longer students had been in school, the least likely they were to give high ratings to taking a written test, reading the textbook, and taking notes while reading the textbook.

The group completing between one-half and three-quarters of their program favored "on the job" training. It should be noted, however, that all groups assigned high ratings to this technique. It was the most favored of all the learning techniques.

This same group viewed doing a workbook exercise as more beneficial than did the other groups, whereas those students nearing completion of their programs preferred working on a project in a group with classmates. This latter situation may be a result of actual work experience or the establishment of a comradeship by the group nearing program completion. This group also gave higher ratings to giving a presentation in front of the class. This could also be because these students had more confidence in their knowledge/experiential base and had established rapport with their peers.

Going on a field trip gained popularity the longer students remained in school. Perhaps these students realized the value of real life experiences by this time, and/or perhaps they were more comfortable travelling with their instructors and peers.

The group of students completing between one-quarter and one-half of their program tended to favor using the computer, whereas the group completing between one-half and three-quarters of their program tended to favor listening to guest speakers, being tutored in problem areas, and role-playing real life situations. Perhaps this middle group did not think they were ready for "on the job" training but were comfortable with role-play as it tends to be less threatening than real life situations.

Cohen and Brawer (1982:254) observe that adults "move in and out of educational experiences, `achieving' educational objectives that are personally rewarding ... "Stop-outs" are not "drop-outs." In contrast to adolescents who take college for granted, adults are more serious about their education and place more value on it (Nordstrom, 1989).
It is entirely possible that many of the nontraditional students surveyed have "stopped-out" and returned to school, perhaps more than once. Whether this phenomena affects students' view of their preferred learning methods is not known.

In general, although there were statistically significant differences in twelve of the thirty-two comparisons based on portion of program completed, there were no glaring or startling differences in the ways that students prefer to learn.

## Grade Point Average

There were differences in students' learning preferences based on grade point average. Of the three groups, students with a grade point average between 2.0 and 2.9 gave the highest ratings to working on a project in a group with classmates, using the computer, reviewing topics in class, and role-playing real life situations.

There was a significant difference (.0001) on the technique of working on a project alone (independent study).

The higher the students' grade point average, the more students perceived this technique to be helpful to their learning. There were significant differences in how helpful students viewed the techniques of asking the teacher questions, going on a field trip, and writing research papers. Again, the higher the students' grade point average, the more helpful students perceived these ways of learning. Other investigators have also found that students with high grade point averages prefer self-directed, discovery type learning experiences.

Seidl and Sauter (1990) studied characteristics of the new nontraditional student in nursing. These investigators found that nontraditional students had higher grade point averages than their younger counterparts. Additionally, "there was a large and significant difference between the traditional and nontraditional groups with respect to their scores on the Learning Styles Index ($t = 2.88$, $df = 27$, $p < .01$ (.004)" (17). Nontraditional students were found to be discovery learners in Seidl and Sauter's study.

Whether the students in Seidl and Sauter's study were characterized as discovery learners because they had high grade point averages or because they were adult students is not known. Perhaps both circumstances need to be in place for students to be characterized as discovery learners. Such conclusions are beyond the scope of this study.

## Locus of Control

Of the seventy-three students completing the locus of control instrument, twelve had an internal locus of control; fifty-seven scored in the middle range; and four students had an external locus of control. There were only four techniques out of thirty-two on which the three groups differed significantly.

Internals favored taking a written test, listening to the teacher lecture, and listening to an overhead and lecture presentation. Both the internal and middle groups found programmed instruction more helpful than did the external group.

These findings are consistent with those reported in the literature (for example, Perry and Penner, 1990). Students with an internal locus of control do well with passive instruction because they are self-directed and highly motivated in their study and do not need the teacher to provide a student-centered learning environment for them. They will take what they want out of the learning situation despite the effectiveness level of the teacher.

## Learning Style

There were six techniques on which significant learning style differences surfaced. Accommodators found audio-visuals more helpful than did the other groups. Assimilators were the group least likely to find this technique useful. Working on a project in a group with classmates was perceived as helpful to divergers. Again, assimilators were the group least likely to view this technique as helpful.

Although all groups rated the technique highly, both accommodators and convergers tended to view "on the job" training as the most helpful to their learning. Assimilators were more favorable to working on a project alone, whereas accommodators, followed by divergers, were more favorable to being tutored in problem areas. Accommodators also preferred role-playing real life situations more than did the other groups.

The fact that accommodators found audio-visuals useful is in keeping with the notion that accommodators combine the learning steps of concrete experience and active experimentation. Assimilators are less focused on people and more interested in abstract ideas and concepts. It is interesting that this group was the least interested in working on a project with a group of classmates.

Accommodators and convergers share the learning step of active experimentation. It is in keeping with this notion that these two groups were found to prefer "on the job" training even more than the other two groups. Assimilators, the group that according to Kolb (1985) is less focused on people when they learn and more focused on abstract ideas and concepts, were the most amenable to working on a project alone (independent study).

Accommodators tend to rely on people to help them learn. It is understandable then that this group preferred being tutored in problem areas rather than attempt to solve the problem themselves. This same group favored role-playing real life situations more than did the other three groups. According to Kolb (1985) accommodators have the ability to learn primarily from "hands-on" experience. Role-playing and "on the job" training are both learning techniques affording learners "hands-on" or practical experience.

The findings resulting from the comparison of learning styles and preferred learning techniques were relatively consistent with other studies using Kolb's LSI. It should be noted, however, that there are skeptics of the Kolb LSI, particularly in the field of nursing. The validity of the instrument for use with nursing students is currently being questioned. It should be remembered that approximately one-third of the student sample in this study consisted of nursing students.

## Ways of Coping

Students did not differ in their preference for learning techniques based on the processes they used to cope with stress. One exception is that students using "escape" as their predominant coping process tended to prefer being tutored in problem areas more than did the other groups; however, the probability between groups (.049) was barely significantly different than chance.

The coping process, "escape," is described as "wishful thinking and behavioral efforts to escape or avoid the problem" (Folkman and Lazarus, 1988:8). It would not appear that one was attempting to escape the problem by being tutored in problem areas. Only repeated testing would substantiate the significance of this finding. There is no documented research on preferred learning techniques with the Ways of Coping Questionnaire. Studies using this questionnaire have been documented in the areas of the following: situational correlates of coping, personality correlates of coping, gender differences, coping and psychological adjustment, and age differences in coping. Additional research in this area is needed.

## Other Helpful Learning Techniques

There are multiple other instructional techniques that teachers could use to assist with student learning. Other helpful learning techniques identified by students included the following: correcting homework in class, study-guides with textbooks, using real-life examples during the lecture, and playing role games. Instructors should include a variety of techniques that best meet the needs of students. If, for example, learning games are helpful to students, they should be utilized. A simple survey of students' preferred learning techniques, conducted by teachers at the start of a course, would identify the learning techniques believed by students to be the most helpful to their learning. Teachers would then be armed with the information needed to engineer the learning environment best suited to their students.

Even if many students do not appear to know what learning techniques they prefer, they do know which techniques they do not want. This information is also very useful to the learning facilitator (teacher). The teacher can delete or omit the types of learning experiences that are not perceived as helpful to students' learning.

### Most Helpful Techniques

Overall, NMTC students preferred "on the job" training for helping them to learn. In fact, students from all three academic areas rated "on the job" training as the one most helpful learning technique. Watching a demonstration and doing homework assignments were also favored learning techniques common to the three groups.

Other favored learning techniques included the lecture, listening to an overhead and lecture presentation, performing a procedure in the lab or shop, reviewing topics in class, doing a workbook exercise, practical exams, personalized (individualized) instruction, homework, field trips, and small group study.

All of the techniques identified by students are considered in the literature to be "traditional" or time-honored ways of learning. They are also relatively typical of vocational-technical students. Generally speaking, the desire for the mix of practical learning and highly structured learning is to be expected of vocational-technical students.

The preferred learning techniques of students in the sample are consistent with those found in Drummond and

Sutton's (1978) research on teaching/learning in the vocational technical institutes. The consistency of findings is particularly meaningful, and fascinating, when it is remembered that the mean age of the vocational-technical student in 1978 was nineteen, and the mean age of the NMTC student in 1992 is twenty-eight and six-tenths years.

More and more investigators are coming up with findings that are not consistent with principles/theories of adult learning. For example, Check (1984) conducted a study, at the University of Wisconsin-Oshkosh, to determine theoretical models, learning styles, and activities adult learners prefer. Respondents showed a preference for an eclectic theoretical approach to teaching and learning. These same subjects strongly endorsed learning by insight, indicating that their favored mode of learning was through the lecture and discussion approach. Furthermore, these same subjects desired an outline of the lecture.

The findings of this study are at odds with adult learning theory. Perhaps vocational-technical students are somehow different from college/university students. It is feasible that adult learning theory is, for some unknown reason, not applicable to NMTC`s adult students. It is conceivable that respondents rated the learning techniques based exclusively on the techniques with which they were familiar. If students did not have the opportunity to learn via role-play or debate, they may not have assigned high ratings to these techniques.

Almost one-half of the respondents were nontraditional. Do older students tend to learn in the same ways they were taught when they were children? Is it possible that nontraditional students were taught by passive (traditional) means as children; therefore, they prefer to learn in passive ways today? Do repeated learning experiences, such as lecture and homework, make students comfortable with these learning experiences and uncomfortable with less practiced learning experiences, such as student presentation and role-play? These questions, and many others, must be taken into consideration when determining the credibility and usefulness of research findings on teaching and learning.

## Common Teaching/Learning Techniques

The surveys completed by faculty and students contained twenty-three teaching/learning techniques in common. A comparison of the computed means for each of the common techniques for both groups showed differences in perception by the students and the faculty. The techniques on which the two groups showed the most disagreement were as follows: written exams, questioning students, "on the job" training, student led discussions, field trips, and role-play. There was moderate disagreement on the helpfulness of the lecture, teacher led discussion, laboratory/shop, individualized instruction, peer teaching, small group study, independent study, library or research papers, and independent study.

Faculty viewed the written exam as extremely beneficial for helping students to learn. Students, on the other hand, ranked written exams thirteenth in importance out of a list of twenty-three techniques. Perhaps faculty value the written exam as an important evaluation tool, whereas students may not be as concerned about evaluation.

Faculty believed questioning students was a valuable learning technique, but students did not concur. Again, this technique falls in the domain of evaluation. An area that may be of more interest to faculty than students. Students ranked "on the job" training as their most preferred learning technique. Faculty rated this technique thirteenth on the list of twenty-three items. It would appear that vocational-technical students are anxious to acquire work experience. It should be remembered that the majority of student respondents were employed outside of the home. These students may have first-hand knowledge of the benefit of work experience. Educators, on the other hand, have been accused of hiding out in ivory towers and being steeped in academia. If there is any merit to the accusation, faculty may "play down" the value of work experience because many years of academia has colored, or distorted, their perception of the value of this learning technique. This cannot be true for all faculty, however, because "on the job" training ranked fifth on faculty's list of most successful teaching techniques.

Field trips, and role-play are student-centered learning activities. Faculty rated these techniques lower than did students. Perhaps vocational-technical faculty are more comfortable with teacher-centered techniques. Also, alot of preparation in the way of resources, and planning are necessary for these activities. This may be prohibitive.

It is interesting to note that students ranked student led discussions much lower than did faculty. This technique is student-centered. Perhaps students feel that teachers are not doing their "jobs" when students are responsible for leading discussions. Perhaps students believe they are not "getting their money's worth." It part, it may be that vocational-technical students have not been groomed to lead discussions in the classroom.

## CONCLUSIONS

Based on an analysis of the faculty data, the student data, and a comparison of the two sets of data, the following conclusions are drawn:

1. The ten preferred teaching techniques of the NMTC faculty are: lecture, written exams, questioning students, homework, demonstrations, teacher led discussions, review sessions, practical exams, laboratory/shop, and slides/ filmstrips/videos.

2. The least favored teaching techniques of the NMTC faculty are as follows: panel presentation/debate, role-play, independent study, student presentations, programmed instruction, field trips, research papers, computer aided instruction, small group study, and student led discussions.

3. Faculty's personality type affects the teaching techniques chosen for use. For example, realists prefer to use student led discussion and individualized instruction; socials make more frequent use of student presentations; realistic, investigative, and artistic teachers made the most use of slides/filmstrips/videos.

4. Teaching experience is not a factor, or consideration, in the frequency of use of certain teaching techniques by NMTC faculty. Whether a faculty member has had three years of teaching experience or thirty years, does not make a difference in the teachers' repertoire of approaches to instruction.

5. Faculty from the four academic departments place different value on the use of various instructional techniques. Nursing instructors view audiovisuals more favorably than do other NMTC faculty. Trade and technical instructors make the greatest use of programmed instruction and individualized instruction. The general education and business technology instructors do not place a high value on field trips as an instructional strategy. Trade and technical instructors and business instructors believe practical exams are more useful than do other NMTC instructors. Lastly, trade and technical instructors and nursing instructors make more frequent use of the laboratory/shop than other NMTC faculty.

6. NMTC faculty believe that the traditional, time-honored, didactic teaching methods involving the giving

of information and the application of knowledge (theory) the most beneficial for assisting NMTC students to learn. In general, faculty do not perceive active, student-centered instructional techniques as beneficial to students' learning.

7. NMTC students find the following, predominantly teacher-centered, learning techniques the most helpful to their learning: "on the job" training, watching a demonstration, performing a procedure in the lab or shop, asking the teacher questions, taking a "hands-on" test, receiving personalized instruction from the teacher, doing a workbook exercise, being tutored in problem areas, listening to the teacher lecture, and doing homework assignments.

8. NMTC students view the following, predominantly student-centered learning techniques, as not helpful to their learning: giving a presentation in front of the class, leading a class discussion, writing a research paper, participating in a group presentation or debate, receiving instruction from other students, using the computer for learning purposes, working with programmed instruction materials, listening to an overhead and lecture presentation, working on a project alone, and answering the teacher's questions.

9. Gender differences do exist in the ways students prefer to learn. Women prefer the more passive learning methods, such as taking a written test, listening to the teacher lecture, doing a workbook exercise, taking notes while reading the textbook, receiving personalized

instruction, working with programmed instruction, and reviewing topics in class. Men prefer to learn actively by working on a project in a group with classmates, performing a procedure in the lab or shop, answering the teacher's questions, taking a "hands-on" test, and using a computer for learning purposes.

10. Age does influence the way students learn. Older students prefer passive, teacher-centered learning methods such as taking a written test, listening to the teacher lecture, doing a homework assignment, reading the textbook, and participating in a class discussion led by the teacher. Younger students, more than older students, prefer taking a "hands-on" test.

11. NMTC students do learn differently, depending upon whether they are married, divorced, or single. Married students prefer the traditional, passive ways of learning. Divorced students believe workbook exercises help them to learn, and single students are more apt to desire a "hands-on" test than divorced or married students.

12. There is little difference in the preferred learning techniques of students working outside of the home and those who have not worked outside of the home. One exception is that students without work experience outside of the home use the technique of writing answers to questions in the text.

13. Students learn differently depending upon the portion of the program of study completed. For example, the longer students are in school, the less apt they are to

believe that a written test is beneficial to their learning. Another example is that the technique of student presentation gains popularity the longer students are in school.

14. Students learning preferences are impacted by their grade point averages. For example, the higher the students' grade point average, the more likely they are to enjoy working on a project alone (independent study), asking the teacher questions, going on a field trip, and writing research papers.

15. Locus of control affects the manner in which students learn. Students with an internal locus of control favor taking a written test, listening to the teacher lecture, and listening to an overhead and lecture presentation. Both students with an internal locus of control and a middle locus of control prefer programmed instruction more than do students with an external locus of control.

16. Students' learning styles influence the ways in which they prefer to learn. For example, accommodators like audiovisual aids; divergers like to work on a project in a group with classmates; accommodators and convergers like "on the job" training; and assimilators enjoy working on a project alone.

17. The ways in which students cope with stress does not influence, to any major degree, the ways in which they choose to learn.

18. The most helpful learning technique of the NMTC students is "on the job" training. Demonstration and homework assignments are also very helpful learning techniques for these students. Nursing students and business students learn well from listening to the teacher lecture. Additionally, nursing students like to listen to a lecture and overhead presentation and read the textbook.

Performing a procedure in the lab or shop, taking a "hands-on" test, and reviewing topics in class are favorite ways of learning by nursing and trade and technical students. Business students like to do workbook exercises. Trade and technical students do not enjoy taking notes while reading the textbook. Trade and technical and business students want to be tutored in problem areas, to receive individualized instruction from the teacher, to ask the teacher questions, and to work on a project in a group with classmates.

19. There is a discrepancy in the way students and faculty view the helpfulness of the twenty-three teaching and learning techniques. The two groups value, in much the same way, the following techniques: review sessions, audio-visuals, computer learning, programmed instruction, panel presentation/debates, student presentations, demonstrations, and homework.

The two groups disagree on the value of written exams, questioning students, "on the job" training, student led discussions, field trips, and role-play. There is moderate disagreement between the students and faculty on the value of the lecture, teacher led discussion, laboratory/shop, individualized instruction, peer teaching, small group study, independent study, research papers, and independent study.

20. A variety of instructional approaches should be utilized by NMTC faculty if the learning preferences of NMTC students are to be accommodated.

## IMPLICATIONS

NMTC faculty make use of teacher-centered instructional methods more often than student-centered, instructional methods. Students are thought to learn passively; active teaching techniques are assumed not to be as effective for students' learning. Faculty predominantly use the lecture method of instruction. It is an implicit assumption that presentation equals learning, that is, what is presented (or covered) in the lecture is what the student learns. Rogers (1970:177) says that "it scarcely seems possible that intelligent men could hold to this assumption."

Brookfield (1987), like Rogers, firmly believes that students and teachers must be forced to step out into unknown territories if critical thinking is to result. He says "by becoming involved in activities that we have traditionally avoided or never considered, we can have our powers of imagination released" (131). The implication of this finding is that faculty must use a variety of instructional methods including student-centered, active methods.

An additional implication is that if faculty expect administration to preserve their freedom of choice in the classroom they must take the heavy responsibility for analyzing more carefully the manner in which they spend class time (McKeachie, 1986). "Do teachers really teach differently in small classes than in large? Are they making optimal use of the resources within their control? Can teachers honestly say that a change would be less effective or enjoyable without trying it?" (298).

Because faculty's personality type influences the choice of instructional methods, a great deal of collaboration should take place between the various personality types to ensure that students' learning needs are being met. The same is true of faculty in the four academic departments. In that differences exist in the instructional techniques chosen for use by faculty in the various departments, collaboration between departments must be a planned occurrence. Administrators/faculty must know the value of peer review and planning sessions among all NMTC faculty.

Faculty viewed the giving of information to students, the application of knowledge, and evaluation methods as the best means for helping students to learn. The implication is that faculty should be aware of the value, and use, of instructional methods that are non-practical in orientation. Students' self-directed learning readiness and learning styles should be assessed by faculty each semester and teaching techniques should be tailored to meet the needs of students.

Students identified learning techniques beneficial to their learning that were not commonly used at NMTC, for example, correcting homework in class, and simulation games. Many faculty may make use these techniques. If so, they should discuss the use of these techniques with their peers. The wealth of teaching/learning knowledge currently available at NMTC should be shared.

Generally speaking, students prefer practical and traditional ways of learning, and faculty prefer to use practical and traditional ways of teaching. It is understandable that the lecture method of instruction is the predominant method of classroom instruction at NMTC, and it is suspected that it will continue to be the predominant technique used. Based on this supposition, an implication is that the lecture method of instruction should be embellished, or enhanced. The "Nuhfer system," or student management teams (SMT) could be adopted and implemented on a trial basis by a few interested faculty. This pilot study would serve as a continuation of the teaching/learning research currently being conducted by graduate students at NMTC.

Another implication relative to the need for enhancing instructional skills at NMTC is that all faculty should receive education/training in the area of teaching and learning, predominantly adult learning. Workshops could be offered on campus. Faculty could be encouraged to engage in internships at other two-year schools demonstrating instructional excellence. Generally, more emphasis should be placed on instructional excellence. Administrators should continue to provide support for these efforts in the way of resources and recognition/award of instructional excellence.

Learning and teaching theories function better as a resource than as commandments engraved in stone. These theories all offer valuable guidance when matched with an appropriate learning task. Faculty need to take an eclectic rather than a single theory-based approach to developing instructional strategies and procedures. Faculty should attain and improve upon instructional competencies. Individual professional development plans should reflect faculty's plan for developing/maintaining instructional competency.

The need for diversity in the curriculum is another implication of the conclusions drawn in this study. If students prefer to learn differently, depending upon such variables as gender, age, locus of control, portion of program completed, grade point average, learning style, marital status, then changes must be made in the curriculum. If students are to develop the life skills and work skills needed to function effectively in today's pluralistic society, curricula will have to be modified/developed to reflect this change. Changes in both instruction and the curriculum are essential if this diversity is to be embraced.

Years of teaching experience does not appear to affect the instructional techniques chosen for use by NMTC's faculty. This implies that new faculty need a solid, comprehensive orientation to a variety of instructional methods and learning theory at the start of their employment. This orientation should be provided by an expert instructor: Someone who has acquired both the credentials and proficiency required for such a "sharing" experience. This kind of "sharing" environment must be created for new faculty prior to the natural shaping of behavior that will occur over time as a result of multiple variables, the most important being peer pressure.

Students do possess different learning styles. Although "hands-on" experience may be great for some students' learning, its use is an anxiety provoking experience for others. Some students learn best by watching their peers and instructors demonstrate procedures, while others learn nothing until they can actually "do it" themselves. It is the responsibility of faculty to find out what learning experiences are anxiety provoking and which are beneficial to students' learning and engineer the learning environment accordingly. It goes without saying, that at any school, there exist many obstacles to this process, for example, contractual requirements, and class size.

Female students appear to prefer passive learning experiences and male students appear to prefer active learning experiences involving group-work. The implication is that gender differences must be taken into consideration when instructors choose instructional methods. Additionally, female students should be encouraged to learn in small-groups and use other active learning methods. It is possible that students have had certain behavioral expectations placed on them by educators. The time has come for educators to be acutely aware of differential expectations placed on male and female students.

Because students place different value on various learning techniques according to the portion of program completed, faculty should schedule the use of learning experiences to be consistent with students' developmental stages. The same approach should be used by faculty with students' possessing different grade point averages. For example, the top students (highest grade point averages) in the class prefer independent study, research papers, field trips, and asking the teacher questions. These ways of learning should be made available to them.

Because students representing all three academic departments favor "on the job" training more than any other learning method, this method should be made available to them at some point or multiple points in their educational experience at NMTC. Multiple ways of evaluating students' learning should be used, if possible. If a student consistently does poorly on a multiple-choice exam, for example, a different type of exam should be administered. If it is mandatory that students take a certain type of exam, they should be tutored on the art/skill of taking that type of exam. Another implication involves test competency. All faculty should be competent in the area of test construction.

Traditional and nontraditional students do prefer to learn differently. Teachers must recognize this situation and act upon it accordingly. Students should be made aware of this phenomena so they can make informed decisions about their learning experience. Generalizations about how various groups of students learn should not be made, rather a careful assessment of students' learning needs should be made, recognizing that multiple variables affect learning. The major implication involving the age of students is that faculty cannot assume that the "time-honored" ways of teaching are necessarily the best for every single student in their classroom. Madeline Hunter states:

> There are no teacher or student behaviors that have to be in every lesson ... We are ... becoming sensitized to the appropriateness, artistry, and outcomes of what is occurring in the classroom... This necessitates skill in selecting from a pharmacy of educational alternatives, not being committed to one "best way" (Caine and Caine, 1991:88).

## Recommendations for Implementation, Dissemination, and the Improvement of Practice

The findings of this study lead to making the following recommendations to the NMTC senior administrators. It is suggested that authority be delegated to the NMTC professional development committee and the curriculum committee for implementation of recommendations. The recommendations should be considered an action plan for instructional improvement at NMTC. Time lines and budget projections should be set by the committees and the action plan should be incorporated in to NMTC's strategic plan.

1. It is recommended that faculty add student-centered instructional methods to their repertoire of commonly used methods, thereby utilizing a variety of instructional methods.
2. Faculty should be encouraged to conduct action research on teaching/learning in their classrooms. Rewards, recognitions, time, and other incentives should be provided by administrators for this type of professional activity.
3. Steps should be taken to assist faculty and student service staff to adapt to older students. Workshops on adult development, learning, and motivation theory should be provided for faculty/staff. Not only will participation in these workshops provide heightened awareness relative to the differences between traditional and nontraditional students, but personal growth may result.
4. It is recommended that a pilot study be conducted at NMTC on the use of student management teams (SMT's) (Nuhfer, 1991) as a means to enhance the effectiveness of the lecture. The study should replicate the studies being conducted at the University of Wisconsin at Platteville and be conducted under the guidance of Edward Nuhfer.
5. It is recommended that faculty be sensitive to the diversity of students' learning needs and promote a

classroom atmosphere conducive to learning. A learning style instrument should be developed, or adopted (for example, Kolb's LSI), by NMTC faculty and used each semester to assess students' learning needs and concerns. Teaching strategies should be based on the learning styles of students.

6. A variety of tools should be available for the evaluation of students' learning. Tests should contain both objective and subjective items and both practical and theoretical testing should be available.
7. Planned faculty collaboration sessions should occur throughout the academic year. Administration should attend to this type of interaction, supporting its existence with such elements as mandatory attendance, space, and refreshments. Faculty should discuss instructional concerns and share information relative to new or innovative instructional techniques with peers across academic lines and personality types.
8. An instructional skills workshop should be offered yearly at NMTC. The Instructional Skills Workshop (ISW) program (Morrison, 1991) could serve as a model for this workshop. Using this model, a two person team of ISW trainers would offer a five-day on-site Facilitator Skills Workshop to a group of five faculty. These five faculty will represent a

"critical mass" of faculty committed to the ISW program. This will prove crucial in maintaining momentum and interest in the institution. Having completed the facilitator training, the core group of faculty would begin to offer annual ISWs at NMTC.

9. Administrators should consider adopting a number of competencies considered essential for post-secondary educators in any discipline. Instructors should be required to attain and improve upon the competencies agreed to between the instructor and the dean. Some examples of competencies that could be adopted, taken from Albuquerque Technical-Vocational Institute's Professional Plan and Career Advancement Plan (May, 1990) are as follow: evaluate instructional effectiveness; analyze test construction; analyze adult learning styles; identify motivation techniques; integrate student groups into the curriculum; direct field trips; conduct group discussions, panel discussions, and symposiums; employ brainstorming, buzz group and question box techniques; direct students in instructing other students; direct students in applying problem-solving techniques; and individualize instruction.

10. It is recommended that faculty's five-year professional development plans reflect goals and

actions to be taken for attaining instructional excellence. The appropriate authority should approve faculty's plan for instructional improvement.

11. Completion of an orientation program, grounded in contemporary learning theory and principles, is recommended for all new faculty hires. This orientation program should be developed and implemented by a faculty member with graduate credentials, several years of post-secondary teaching experience, and demonstrated expertise in the area of teaching/learning.

12. It is recommended that curricula be modified or developed to promote positive attitudes and understanding of diversity. The curriculum committee should be charged with the responsibility for ensuring that all students have the opportunity to learn about and value diversity in human societies. The resource development officer should be given the responsibility to obtain external sources of funding for balancing the curriculum and for continued faculty professional development.

13. A copy of this report will be given to NMTC's president. It will be recommended that the president take the report to NMTC's management team for review so that a decision can be made relative to disseminating copies of the report to the chairs

of NMTC's curriculum committee and professional development committee for evaluation and possible implementation of relevant recommendations. A copy of the full report will be placed in NMTC's library and employees will be notified of its location. With the permission of the academic dean, the findings of the study will be reported to the NMTC faculty. With the NMTC president's permission, a copy of this report will be forwarded to the president of the Maine Technical College System. Two clean copies of the report will be forwarded to the ERIC Clearinghouse for Junior and Community Colleges for possible publication. Lastly, a condensed version of the report will be submitted for possible publication in an appropriate educational journal.

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# APPENDIX A

# REVISED QUESTIONNAIRES

## FACULTY QUESTIONNAIRE

ACADEMIC DEPARTMENT

______________________

NUMBER OF YEARS OF
TEACHING EXPERIENCE
(all fields - all levels)

_______

COURSES (OR COMPONENTS) COMMONLY TAUGHT

______________________________________________

______________________________________________

PLEASE READ THROUGH THE FOLLOWING LIST OF TEACHING TECHNIQUES AND CIRCLE THE NUMBER CORRESPONDING TO THE FREQUENCY WITH WHICH YOU USE THE TECHNIQUE

| | | FREQUENCY OF USE | | |
|---|---|---|---|---|
| TECHNIQUE | NOT USED | SELDOM USED | MODERATELY USED | FREQUENTLY USED |
| 1 LECTURE | 0 | 1 | 2 | 3 |
| 2 DISCUSSION, STUDENT LED | 0 | 1 | 2 | 3 |
| 3 DISCUSSION, TEACHER LED | 0 | 1 | 2 | 3 |
| 4 SMALL GROUP STUDY | 0 | 1 | 2 | 3 |
| 5 STUDENT PRESENTATION | 0 | 1 | 2 | 3 |
| 6 PANEL PRESENTATION/DEBATE | 0 | 1 | 2 | 3 |
| 7 QUESTIONING STUDENTS | 0 | 1 | 2 | 3 |
| 8 REVIEW SESSIONS | 0 | 1 | 2 | 3 |
| 9 SLIDES/FILMSTRIPS/VIDEOS | 0 | 1 | 2 | 3 |
| 10 PROGRAMMED INSTRUCTION | 0 | 1 | 2 | 3 |
| 11 DEMONSTRATION | 0 | 1 | 2 | 3 |
| 12 COMPUTER AIDED INSTRUCTION | 0 | 1 | 2 | 3 |
| 13 FIELD TRIPS | 0 | 1 | 2 | 3 |
| 14 INDEPENDENT STUDY | 0 | 1 | 2 | 3 |
| 15 INDIVIDUALIZED INSTRUCTION | 0 | 1 | 2 | 3 |

(Cont.)

| TECHNIQUE | NOT USED | SELDOM USED | MODERATELY USED | FREQUENTLY USED |
|---|---|---|---|---|
| 16 HOMEWORK | 0 | 1 | 2 | 3 |
| 17 LIBRARY OR RESEARCH PAPERS | 0 | 1 | 2 | 3 |
| 18 PRACTICAL EXAMS | 0 | 1 | 2 | 3 |
| 19 WRITTEN EXAMS | 0 | 1 | 2 | 3 |
| 20 PEER TEACHING | 0 | 1 | 2 | 3 |
| 21 LABORATORY/SHOP | 0 | 1 | 2 | 3 |
| 22 "ON THE JOB" TRAINING | 0 | 1 | 2 | 3 |
| 23 ROLE-PLAY | 0 | 1 | 2 | 3 |
| 24 OTHER (PLEASE SPECIFY) | 0 | 1 | 2 | 3 |

1. Which of the above teaching techniques do you believe have been most beneficial in assisting students to learn effectively? Identify the number(s) from the above list corresponding to the technique(s) of your choice.

2. Please describe a specific illustration of one of your most successful teaching techniques.

   Course:

   Describe Technique:

3. Please describe any new or innovative technique you are currently trying.

   Course:

   Describe Technique:

4. I would be pleased to credit you for your innovative teaching technique. If you would like this, please print your name in the space provided.

   NAME ______________________

## STUDENT QUESTIONNAIRE

### Part 1

Major Program at Northern Maine Technical College: ______________________

Grade point average: below 2.0 ___ 2.0 - 2.9 ___ 3.0 and above ___

Age: 17 - 22 ___ 23 - 55 ___ over 55 ___

Gender: female ___ male ___

Portion of program completed: less than one-quarter ___
between one-quarter and one-half ___
between one-half and three-quarters ___
over three-quarters ___

Marital Status: single ___ divorced ___ married ___ widowed ___

Have you ever been employed outside of the home: yes ___ no ___

### Part 2

INSTRUCTIONS: There are many different ways to learn and teachers use a variety of teaching techniques to help students learn. A number of techniques are described by the items in this survey. Read each item and decide how helpful that particular technique is in assisting YOU to learn at Northern Maine Technical College.

There are five possible answers to each item. The undecided answer should be used only when you have no opinion. Please circle the number corresponding to the answer that best represents your thoughts.

RESPONSE KEY

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Hinders or Prevents Learning | Not Helpful | Undecided | Somewhat Helpful | Extremely Helpful |

Learning Technique

| | | | | | |
|---|---|---|---|---|---|
| 1 Taking a written test | 1 | 2 | 3 | 4 | 5 |
| 2 Viewing slides, filmstrips, or videos | 1 | 2 | 3 | 4 | 5 |
| 3 Listening to the teacher lecture | 1 | 2 | 3 | 4 | 5 |

(Cont.)

RESPONSE KEY

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Hinders or Prevents Learning | Not Helpful | Undecided | Somewhat Helpful | Extremely Helpful |

Learning Technique

4 Watching a demonstration 1 2 3 4 5

5 Doing homework assignments 1 2 3 4 5

6 Reading the textbook 1 2 3 4 5

7 Asking the teacher questions 1 2 3 4 5

8 Doing a workbook exercise 1 2 3 4 5

9 Working on a project in a group with classmates 1 2 3 4 5

10 Performing a procedure in the lab or shop 1 2 3 4 5

11 "On the job" training 1 2 3 4 5

12 Writing answers to questions in the textbook 1 2 3 4 5

13 Participating in a discussion led by the teacher 1 2 3 4 5

14 Taking notes while reading the textbook 1 2 3 4 5

15 Receiving personalized instruction from the teacher 1 2 3 4 5

16 Giving a presentation in front of the class 1 2 3 4 5

17 Participating in a group presentation or debate 1 2 3 4 5

18 Working on a project alone (independent study) 1 2 3 4 5

19 Using the library 1 2 3 4 5

20 Working with programmed instruction materials 1 2 3 4 5

21 Answering the teacher's questions 1 2 3 4 5

22 Going on a field trip 1 2 3 4 5

23 Taking a "hands-on" test 1 2 3 4 5

24 Using the computer for learning purposes 1 2 3 4 5

(Cont.)

RESPONSE KEY

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Hinders or Prevents Learning | Not Helpful | Undecided | Somewhat Helpful | Extremely Helpful |

Learning Technique

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| 25 Listening to guest speakers | 1 | 2 | 3 | 4 | 5 |
| 26 Listening to an overhead and lecture presentation | 1 | 2 | 3 | 4 | 5 |
| 27 Receiving instruction from other students | 1 | 2 | 3 | 4 | 5 |
| 28 Being tutored in problem areas | 1 | 2 | 3 | 4 | 5 |
| 29 Writing a research paper | 1 | 2 | 3 | 4 | 5 |
| 30 Leading a class discussion | 1 | 2 | 3 | 4 | 5 |
| 31 Reviewing topics in class | 1 | 2 | 3 | 4 | 5 |
| 32 Role-playing real life situations | 1 | 2 | 3 | 4 | 5 |
| 33 Others (list) | 1 | 2 | 3 | 4 | 5 |
| 34 | 1 | 2 | 3 | 4 | 5 |
| 35 | 1 | 2 | 3 | 4 | 5 |

Which two learning techniques are the BEST for helping you to learn? Identify the number(s) from the above list corresponding to the technique(s) of your choice.

## Part 3

You have a short questionnaire attached. It may be the Internal/External Control Scale, the Learning Style Inventory, or the Ways of Coping Questionnaire. Look at the title of the survey and decide which it is and read the instructions about how to complete it. The investigator will clarify the instructions for you before you complete the questionnaire.

# APPENDIX B

# PERMISSION LETTER

NMTC

**Northern Maine Technical College**

33 Edgemont Drive
Presque Isle, Maine 04769
(207) 769-2461
FAX (207) 764-8465

**Office of the Vice President
and
Dean of the College**

TO: Norma McKinnon

FROM: Tim Crowley, Acting Vice President

DATE: January 17, 1992

RE: QUESTIONNAIRE FOR FACULTY & STUDENTS

I have reviewed both the faculty and student questionnaire that you would like to use on campus. Both instruments will provide information that will be helpful to NMTC, as we continue to look at the relationship between teaching techniques and learning.

You may proceed with these surveys. If I can be of any assistance in the process, do not hesitate to call.

TC:jmc

# APPENDIX C

# MOST SUCCESSFUL TEACHING TECHNIQUES

## MOST SUCCESSFUL TEACHING TECHNIQUES

Small Computer Systems - The entire course is work-group oriented from concept examinations to "hands-on" projects. Each student is required to attend a private exit interview with me to evaluate their performance as a team-member.

Computer Programming III - A five phase process is used: the 1) problem to be solved is described (as a user would); 2) the students and instructor, as a team, discuss possible solutions (steps and pitfalls); 3) the students solve the problem on the computer system; 4) a peer review of the solutions is conducted; a written test is administered over the content/skills learned.

Technical Communications - Holding individual conferences with students, concerning the development of resumes.

Respiratory Assessment - Role-playing in class. Students carry out the respiratory assessment on one another. They assess actual patients in clinical with the instructor's assistance.

Nursing - Coordinated cultural seminars. We invite guest speakers from the community and use an open discussion format. Ethnic recipes are brought in by students and the nutritional aspects of the recipes are discussed. Many students actually bring in the various entrees and students/ instructors eat the food and discuss it.

Nursing - Application of new concepts/information in specific, real-life case studies and scenarios by small groups of students in a classroom setting.

Nursing - Students work together in small groups to answer teacher formulated questions about the content under study. Students then give group presentations to the entire class of students.

Nursing - To teach orthopedic nursing students have hands-on experience manipulation traction equipment, braces, splints, etc. Additionally, students practice neurovascular assessments on each other.

College Algebra - I ask students to explain, aloud, the steps in a certain algebra problem. For example, "Jane, tell me how to factor 3 x 3 - 81." You can easily determine the problem areas from the student's response.

U.S. Economic History - I assign students readings with questions. The questions serve as a guide for class discussion and help students to prepare for class; Also, the questions are used as a basis for examination, focusing students' minds on important concepts and questions.

Many Business Technology Courses - After completing a unit of study, I provide the students with a study-guide. This guide highlights the important points. Prioritizing and time management are reinforced in this manner. All study-guide material comes directly from the text.

Automotive Technology - Demonstrations on all aspects of automotive service work are provided.

Basic Electricity and Electrical Construction - Peer teaching in a trade laboratory. The student completes (masters) proficiency in a skill and teaches (explains and demonstrates) the skill to her/his peer.

Computer Electronics - Use preprogrammed defects of differing difficulty levels. I use a low difficulty defect for students with minimal confidence and a higher difficulty defect for students with higher confidence levels. It appears to build up the confidence level of students.

Drafting Technology IV - Use office simulation with job captains and "real world" activities involving individual student projects.

Supervisory Management - Group dynamics activities, for example, the desert survival scenario. Students are randomly placed in groups to discuss and rank order various elements within the scenario.

Occupational Safety - Lecture and demonstration on personal protective equipment and MSDS.

Blue Print Reading - Students quote prices as sub-contractors from actual sets of commercial blue prints.

Accounting - 50% fear; 50% humor

Physics - Use small group discussion and team-work on assignments. Group exams are administered. Exams are backed-up with spot quizzes of an closed-book, individualized nature.

Business Technology Courses - The teacher's attitude and enthusiasm make a big difference in successful teaching. Also, recognition of class members as individuals who learn differently.

# APPENDIX D

# NEW OR INNOVATIVE TECHNIQUES

# NEW OR INNOVATIVE TECHNIQUES

Telecommunications - Part of the course involves "distance learning," using modems.

Technical Communications - The use of problem/solving tasks with small groups of students. We discuss workplace situations and attempt to solve problems. Memos are sent to employees, etc.

Computer Programming IV - Interactive student team problem solving is used. Team authority and responsibility is stressed. As much as possible, the instructor observes, then evaluates the interaction.

College Physics I - Students break out into small groups and practice problem-solving methods. The students have one another and the instructor available to help them. J.P. Levasseur

Nursing - Learning games, like jeopardy, are used to teach nursing content to a class of 60+ students.

Nursing - Giving students short scenarios to role-play and have other students critique and discuss the situation.

Nursing - Use of the "living sculpture" to teach disease processes, for example, AIDS and leukemia.

Business Systems Analysis II - Students in groups use computer aided systems engineering software to analyze and document the analysis of information systems. Dave Parsons

Word Processing - No text is used in this five week course. I created an entire coursework "instruction brochure." It is very beneficial to students ... they love it! Paula York

Automotive Technology - Students follow procedures for automotive diagnosis and repair, using computer aided instruction. Dan Boyd

Basic Electricity and Electrical Construction - Teacher made problems and examples are used in both courses rather than textbook problems/examples. Brian McDougal

Drafting - CAD computer is used.

Human Relations - Many variations of presentation are used in the classroom. After fifteen minutes or so, I switch to one, or more, of the following: overhead, board, posters, articles, handouts, review session, book lecture, etc. Ann Osgood

Sales Fundamentals - Students role-play the actual experience of selling and buying. Students are randomly selected to play the roles of seller and buyer. Sellers announce the product or service to sell two weeks prior to the role-playing session. Buyers are assigned various role-playing scenarios and a specific seller from whom to buy. The experience occurs in the classroom. The remainder of the class participants serve as critics for constructive feedback purposes upon completion of the demonstration (role-play). After the demonstration has been analyzed, the strengths and weaknesses are identified.
Gene Michaud

Occupational Safety - Multiple overhead and slide presentations with discussion of violations as a tool to promote initiative on personal safety. David Guerrette

CO-OP - Job/task analysis list from employers. Dick West

Accounting - Students do personal federal and state income tax returns for the public. Students spend five hours per week using the computer and dealing with the public one-on-one. They have to think on their feet. This is "on the job" training and "individualized" instruction all at once.

Basic Electronics - Computer interactive programs.
Lloyd Duncan

# APPENDIX E

# OTHER HELPFUL LEARNING TECHNIQUES

# OTHER LEARNING TECHNIQUES HELPFUL TO STUDENTS

Study-guides with textbooks

Writing research papers takes away the time I need to commit myself to my other classes

Correcting homework in class

A relaxed atmosphere in the classroom

No related courses, such as physics and algebra for auto body students; they are not needed

Individual projects

Being graded on performance and test scores only (current grading system allows instructors to grade according to whimsical desires)

Learning on your own

Trial and error

Taking notes

Lab and "hands on" learning

Listening to the teacher explain things

Using examples from everyday life

Good books

Anything in my major

Playing role games

Self-learning

Going over homework in class

Reading notes at the end of class and at the end of the day

Learning games

A detailed outline of the learning objectives

Rewriting my notes

Reading related articles

Reviewing how equipment works

Shorter lectures

Workbooks

Getting a copy of the notes from a person who takes good notes

Passing out sample questions made by the teacher or a student

Taping lectures

Self-quizzes

Memorization using association techniques

Reading and reviewing on my own

# APPENDIX F

# HOLLAND'S PERSONALITY TYPES

## HOLLAND'S PERSONALITY TYPES

| Type | Characteristics |
|---|---|
| REALISTIC<br>Examples:<br>automotive mechanics<br>building construction<br>culinary<br>heating<br>sheet metal | Prefers realistic occupations or situations. Avoids activities demanded by social situations. Uses realistic competencies to solve problems. Perceived strengths in mechanical and athletic ability. Values concrete things or tangible personal characteristics - money, power, status, asocial, conforming, frank, genuine, masculine, materialistic, natural, normal, persistent, practical, stable, thrifty, and uninvolved. |
| INVESTIGATIVE<br>Examples:<br>electronics technicia<br>computer programmer<br>electricity<br>waste water<br>radiology<br>medical lab | Prefers investigative occupations or situations. Avoids activities demanded by enterprising occupations or situations. Uses investigative competencies to solve work problems. Perceived as scholarly, intellectual, self-confident, having mathematical and scientific ability, but lacking in leadership ability. Values science. Is analytical, cautious, critical, curious, independent, intellectual, introspective, methodical, passive, precise, and reserved. |
| ARTISTIC<br>Examples:<br>English teacher<br>architect<br>artist<br>designer | Prefers artistic occupations or situations. Avoids activities demanded by conventional occupations/ situations. Uses artistic competencies to solve problems at work. Perceived as expressive, original, intuitive, feminine, nonconforming, introspective, independent, disorderly, having artistic and musical ability. Values esthetic qualities. Complicated, emotional, idealistic, imaginative, impractical, impulsive, original. |

| | |
|---|---|
| SOCIAL<br>Examples:<br>food service<br>sociologist<br>home economist<br>nurse<br>science teacher<br>services | Prefers social occupations and situations. Uses social competencies to solve problems at work and in other settings. Perceived as liking to help others, understanding of others, having teaching ability, and lacking mechanical and scientific ability. Ascendant, cooperative, feminine, social friendly, generous, helpful, health idealistic, insightful, kind, persuasive, responsible, sociable, tactful, and understanding. |
| ENTERPRISING<br>Examples:<br>salesman<br>manager<br>retail merchant<br>contractor<br>buyer<br>distributive educator<br>marketing<br>personnel | Prefers enterprising occupations or situations. Avoids the activities demanded by investigative occupations or situations. Uses enterprising competencies to solve problems at work and in other situations. Perceived as aggressive, popular, self-confident, sociable, possessing leadership and speaking abilities and lacking in scientific ability. Values political and economic achievement. Acquisitive, adventurous, ambitious, argumentative, dependent, domineering, energetic, exhibitionists, flirtatious, impulsive, optimistic, pleasure seeking, self-confident, sociable, and talkative. |
| CONVENTIONAL<br>Examples:<br>keypunch operator<br>file clerk<br>typist<br>secretary<br>accountant | Prefers conventional occupations or situations and avoids the activities demanded by artistic occupations or situations. Uses conventional competencies to solve problems at work. Perceived as conforming, orderly, and as having clerical and numerical ability. Values business and economic achievement. Conscientious, defensive, efficient, persistent, practical, and calm. |

# BIOGRAPHICAL SKETCH (1992)

Norma Cole McKinnon
137 Caribou Rd, Caribou ME

Norma Cole McKinnon resides in northern Maine with Ivan, her husband of twenty years, and Nichole, her eighteen year old daughter. Norma is thirty-six years old and has three brothers and two sisters. Her father is an ordained Baptist minister and her mother is not employed outside of the home. Norma's hobbies are motorcycle riding, camping, reading, watching movies, and shopping. Norma possesses both American and Canadian citizenship.

Norma earned an educational doctorate with a concentration in higher education from Nova University in Fort Lauderdale, Florida. She obtained a certificate in higher education administration from Bryn Mawr college and a certificate of advanced study in educational administration from the University of Maine at Orono. Norma has a master of science in nursing with a major in medical-surgical nursing and functional preparation in administration from the University of Texas at El Paso. Norma has earned twelve graduate credits in public administration. Additionally, she obtained a baccalaureate in behavioral science with a major in psychology from the University of Maine at Presque Isle and an associate of science in nursing from the University of Maine in Augusta. Norma has her registered nurse licensure.

Norma holds the following national certifications: General Nursing Practice from the American Nurses' Association;

Basic Life Support Instructor Trainer from the American Heart Association; and, Advanced Cardiac Life Support from the American Heart association. She has received multiple scholarships and superior academic achievement awards throughout her educational process. Norma is a member of the Phi Eta Sigma national honor society and the Sigma Theta Tau international honor society. She holds additional memberships in both educational and nursing associations.

Norma has had several papers and documents published in ERIC and nursing/educational journals in the last two years. The publications involve the following topics: nursing theory, nursing instruction, the political basis of decision-making, professional development, learning styles, mature adult students, and diversity.

Norma's professional work experiece has been predominantly in the fields of nursing and education. She began her nursing career in the pediatrics, obstetric and newborn nursery areas as a staff/charge nurse. She moved on to nursing supervision where she was responsible for supervision of the entire nursing staff at The Aroostook Medical Center in Presque Isle, Maine; a one-hundred bed, acute-care facility.

Prior to her current employment at Northern Maine Technical College (NMTC), Norma was a clinical instructor in the associate degree nursing program at the University of Maine in Presque Isle. She has been a full-time faculty member at NMTC, teaching in both the associate degree and practical nursing programs for the last six years. Also, for the past three years Norma has been fulfilling the duties of director of the NMTC Title III professional development program.

Norma's career goal is to acquire the position of academic dean, preferably at a two-year college. She is dedicated to the mission of the two-year college which provides a high quality education on an egalitarian basis.

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